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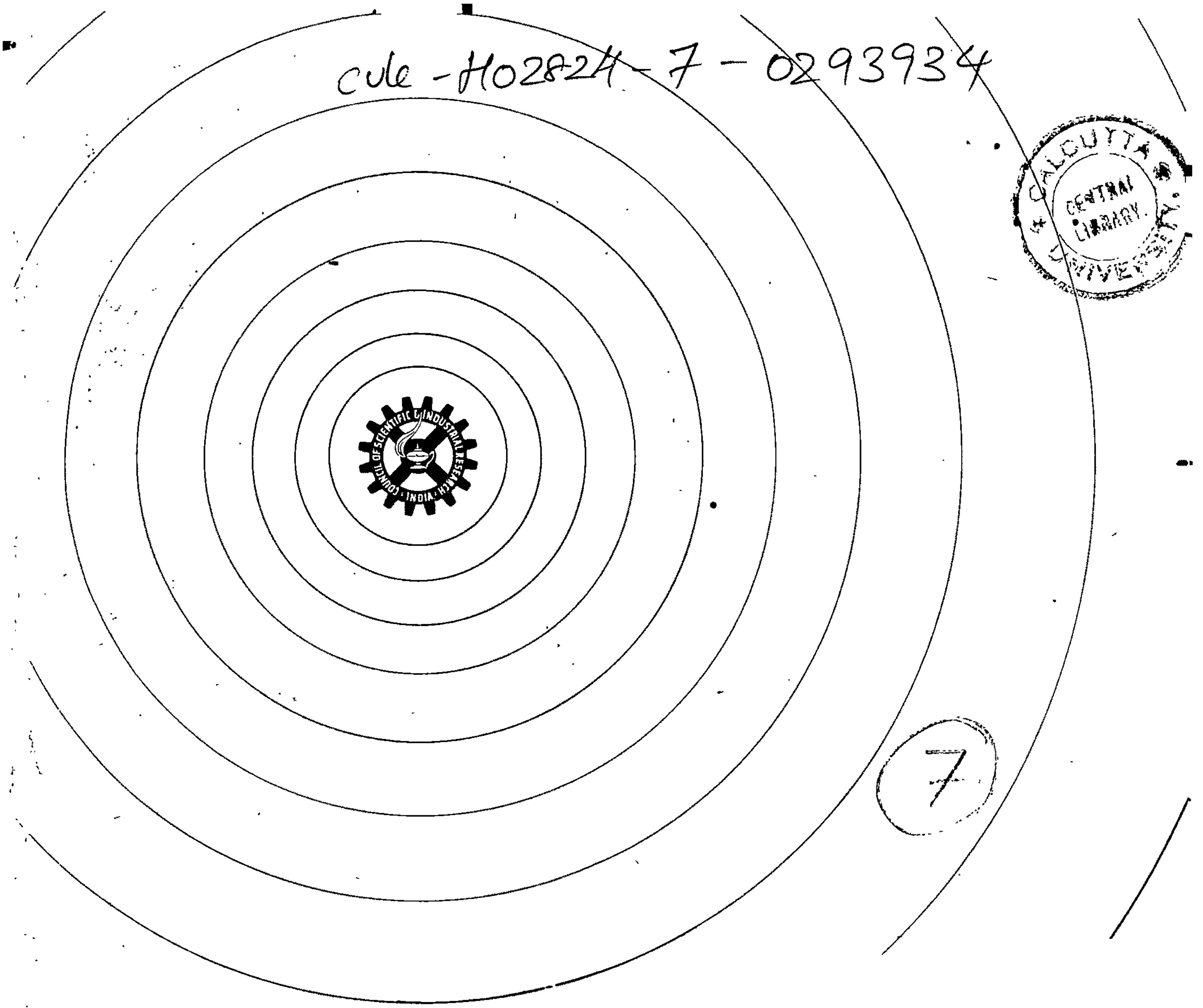

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ANNALS OF LIBRARY SCIENCE AND DOCUMENTATION

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We are privileged to present in the following pages very substantial comments from Dr S R Ranganathan on a paper entitled "Users' survey concerning teachers and research scholars in the Department of Chemistry, University of Delhi" by Krishan Kumar published earlier in the Annals (Vol 15 No 4 Dec 1968, 175-207), -Ed.

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ANNOTATION ON "USER'S SURVEY"

S R Ranganathan
National Research Professor in Library Science and Honorary Professor, Documentation Research and Training Centre, Bangalore-3.

Contents-cum-abstract

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22 Organisation (Pros and cons of Departmental collection. University Library to be a Service-Library and not a Dormitory Library).

23 Function (Inter-literary Loan facility to be frequently publicised by the university library within the university and by the Insdoc throughout the country).

24 Inter-library loan (Suggestion for inter-library loan during Floor duty. Insdoc to publish annual statistics of the inter-library loan as a stimulus to readers asking for it).

25 Catalogue (need for Feature Headings and Cross Reference Entries in the Classified Part to facilitate Long Range Reference Service).

26 Circulation (The due date for return of books be respected in the Departmental Collection also. Minimising of duplication by sound bespeaking system. Library hours to be 14 hours on all the days of the year).

27 Reference Service (Long Range Reference Service essential. Individual pragmatic training of research workers in the use of library tools essential. Clinical training in reference service for library service students essential).

28 Library Administration (New Periodicals to be put on the Display Table from 15 minutes of their arrival in the library and completed within a few hours. While processing a book may take a week, line-clear treatment to be given to any specific book in urgent demand. Shelf-rectification to be a daily routine and be made part of stock verification).

29D Documentation (Weekly documentation to be done by the library so as to act as an appetiser. Insdoc list, the original primary function of the Insdoc to be revived. Insdoc to investigate the causes for delay in Translation and minimise it wherever avoidable. Translator to have triple competence in Translated - from Language, Translated- into Language, and subject-field).

3 Spots in the Sun (Presentation of text to follow the standard observing Principle of Unity of Idea, use of technical terminology and provision of Section Headings and Numbers. Young librarians of renascent India to bear their own burden, without the importing of outsiders at a terrible cost even for trivialities. The table of man hours added at the end to make our young librarians realise the amount of work needed to write a paper).

1 Introduction

11 This is a kind of work which I had been for long looking forward to be taken up by the librarians, or atleast by the teachers of library science in our country.

12 With a little concentrated purposeful thinking, such a piece of work will be possible by every teacher.

13 I trust that this work will enthuse others, and stimulate them to do similar work.

14 There is an endless number of areas calling for such a piece of work.

15 Survey of this kind should lead on to developmental research of one kind or another

16 It may also lead on to applied research.

17 A cumulation of results of such surveys may ultimately lead on to fundamental research also.

18 It is gratifying to find that this Survey, when research in universities is at higl level, confirms my own findings made forty years ago in the Madras University Library, when research was at a low level, recorded in my books and papers. My inferences were both from observation and from the Five Laws -- that is, both by induction and deduction. (See Paper P in Library science with a slant to documentation, V 4, 1967, Development of library science series. 6).

2 Annotation

The sub-sections of this section, give some annotations on the statements by the author of the Survey, just preceding the respective annotations.

20 Reference

The reference within brackets, after a Section Heading, is to the page number in the Survey and to the paragraph number therein. For example, 176.4 means paragraph 4 in page 176.

21 Book Selection

211 Selection Solely by Teachers (201.6)

"A library which totally depends upon teachers to do selection can never build up a balanced collection".

This is a wise statement. This must be brought home to the Faculty members in a tactful way. I have had to deal with such cases when a Professor would recommend most of the books from his own field of specialisation. It took me a few talks "over tea" so to speak, to make him realise the absurdity of it.

212 Lack of Interest (201.6)

".... lack of interest on the part of thos who are responsible for book selection".

This is a truism. But this was the actuality in 80% of the subjects in the Madras University Library when I was there. I used to send to the Board of Studies in each subject, a select list of the latest books costing more than double the amount available, asking its Committee of Experts to indicate the sequence of their preference, or to select to the extent of the finance available. Very often, I used to get a reply such as, "I leave it to you", or "The first forty books"! It is another matter if the library itself is negligent. Then it is criminal.

213 Keeping Track of New Publication (201.6)

"Some of the members of the library staff must keep track of information regarding publications in different fields".

See Sec 2131:2 to 2132:38 of my Library administration, Ed 2 (1959), for the routine to be done by the library staff systematically, as a preliminary to final book selection.

See also Sec LD1:2 to LD2:1:38 of my Library book selection, Ed 2 (1966).

The routine mentioned above was stabilized after an experience of eight years in the Madras University Library, from 1926 to 1934. It worked well till I left Madras in 1945. It also worked well when I introduced it in Banaras in 1945. But the Professors there were not found disciplined to do the final selection even when such well prepared list was placed before them. Therefore, I had to visit their houses in morning hours and make them sit with me and do the work. Some would evade even such a gentle pressure.

214 No need for Subject Specialist in the Book Selection Staff (201.6)

"In order to do full justice, the university library should employ atleast one person who must be a specialist [in the subject]."

This is an extravagant and unnecessary demand. The librarian and the reference staff should be able to do this work. If a specialist reference librarian (documentalist) is appointed for work in a large Departmental Library, he should be the member of the reference staff who should share this work with the librarian.

215 Policy on Duplication (200.12)

"Duplication would be desirable"

A reference book such as Beilsteins Handbuch, of exclusive use only to the Department of Chemistry, could be housed in its Departmental Collection. This will satisfy Law 4 of Library Science without violation to the other laws. A multilingual technical dictionary on this subject will also come in this category. These need not be duplicated. But general linguistic dictionaries may have to be duplicated for several Departments. All other reference books, with probable use by several Departments, cannot be duplicated.

In the University of Delhi, where all higher teaching and research is done by the Department of Chemistry, even advanced treatises of a specialised nature may be housed in that Departmental Collection.

Back volumes of a periodical, exclusively on chemistry, without any seepage of other subjects, may be housed in the Departmental Collection for the number of back years to be determined by the Department. But the current issues should be kept on display in the Central University Library for a specific period. After that period it may be lent to the Members of the Department in the usual way. If this lending is left to the Department itself, it often happens that delicate situations arise in the Department, leading to a virtual, though unintended, denial of the use of the current issues to many of the Members of the Department, involving a violation of Laws 2, and 3 of Library Science.

Learned periodicals and up-to-date reference books form the very breath of research work. Their number is large in each discipline and is also ever increasing. This is in accordance with Law 5 of Library Science. Their cost too is mounting up. This leaves the policy of duplication to be determined by the book fund available. The main guiding principle should be that the book fund should be used for the purchase of as many different periodicals and reference books as possible (See Sec C51 of the Report of the Library Committee of UGC, 1965).

22 Organisation

221 Use of Central Library (185.12)

"Research fellows depend much more on the Departmental Library. But the teachers seem to use both libraries about equally".

One of the dangers of a Departmental Collection, to which a young research person is exposed, is brought out by this finding. This would amount to a violation of Laws 2 and 3 of Library Science. He is likely to become a frog in the well, without acquainting himself with the fringe and the penumbral subjects. This should be corrected in two ways:-

1 The teachers should induct in each new entrant to research the habit of going to the Central University Library, atleast as much as they themselves do, if not a little more; and

2 The reference staff of the Central University Library also has a responsibility in this matter. They should know each individual research worker and attract and retain him as their clientele by bringing to their notice the documents in the fringe and penumbral regions, and in accustoming them to browse the current issues of periodicals on display -- not only periodicals exclusively in their subjects but also other periodicals in which there is usually some seepage pertaining to his own subject. The seepage problem is now wide spread. (See Paper G in Library science with a slant to documentation, V5, 1968, Teaching in Library Science series. 20).

222 Central University Library less used than Departmental Library (186.1)

"Researchers consulted the Delhi University Library less than the Departmental Library".

The corrective to this has been indicated in the annotation in Sec 221. Further, the Survey should have put up a supplementary follow up questionnaire asking for the reason to this practice.

No Reference Service in Departmental Library (176.4)

"The Departmental Library.... issues material to those who are connected with the Department. Beyond this, it does not provide any service".

This is the risk in forming a Departmental Collection. (See also annotation in Sec 263).

224 *Research Materials Available at One Place in Foreign Libraries (189.1)*

"Those who have experience of foreign libraries like British Museum, Science Museum (London), the Institute of Chemistry of Natural Products (Moscow), the Rutgers University, the Manchester University, and the University of London Libraries feel less satisfied with the facilities and the collections of Delhi University Library System. They mentioned that... most of the research material is available in one place".

This implies their asking for all research materials to be concentrated in a central place; while elsewhere (See Sec 225) they have asked for scattering in Departmental Collection. Can this self-contradiction be due to the still persisting Pre-Gandhian difference in attitude to practices and things, Indian and Foreign!

225 *Departmental Collection (187.3)*

"Eighty-four percent use the University Library atleast once a week".

(187.8)

"Fifty-five percent use the Departmental Library daily".

To make the two percentages comparable, "Eighty-four percent once a week" may be reduced to an average of "Fourteen percent using the Central University Library daily", as against "Fifty-five percent using the Departmental Library". This makes out a case for a Departmental Collection, if the number of research workers and finance allow it. In the Delhi University, these conditions are satisfied by the Department of Chemistry. Therefore, the formation of the Departmental Collection in Chemistry in the University, may satisfy Laws 1 and 4 of Library Science.

226 *Dormitory Library (200.10)*

"Some suggested that college libraries ought to do weeding of books, which should be collected at the University Library".

This is a deep problem in the organisation of the Library System of the country. This problem is not generally examined in the proper way. The above suggestion would make every university library a dormitory library for rarely-used and out of date books. This will decrease its efficiency as a service library. Further, it will call for undue expenditure on building, fittings, and maintenance in each university library. This fact should be brought to the notice of the research workers in the Department to correct the spread of such an unrealistic attitute.

2261 *An Experience*

About ten years ago, I visited a big university library, as the Chairman of the Library Committee of the UGC. That University had asked for a fantastically large Building-Grant for the Library. On enquiring on the spot, it was found that some of the dons of that University were interested more in the size of the Library than in its service. They wanted to retain all kinds of outmoded and very infrequently wanted materials. When the Members walked round the stackroom, the dust collected on the top-edges of a large number of books pleaded eloquently against a University Library becoming a Dormitory Library.

2262 *Direction of Law 5*

In this connection, it should be remembered that Law 5 of Library Science - a Library is a Growing Organism - would ask us to pay special attention to the implications of the word 'Organism'. There are two ways in which an Organism grows:-

1 Child growth, implying addition and increase in size; and

2 Adult growth, involving replacement, and little or no growth in size.

A Dormitory Library has Child Growth. A Service Library should have only Adult Growth; and a University Library is a Service Library. For reasons of economy of every kind, a single National Dormitory Library is sufficient for a small country; and in a large country, such as India, a single State Dormitory Library for each constituent State is sufficient. Thus according to Law 5 of Library Science, all books weeded out from all Service Libraries should be notified to the Dormitory Library concerned. And it will select the soundest copy of each book for its Dormitory Collection, and ask the other copies to be "reduced to pulp". For, it is dangerous to make out-of-date books accessible to readers other than those interested in antiquarian, bibliographical, and historical research.

From this angle, the Indian Standards Institution has recommended on upper limit of 100,000 to 300,000 volumes to be kept in a University Library. (See IS:1553-1960; Code of practice relating to primary elements in the design of library buildings, of the Indian Standards Institution).

23 Function

(183.6)

"If an item in which a researcher is interested is not available in the library, he tries to get it from a local library. In most cases, if the researchers are not able to get it from the local library, they try to manage without it".

(191.4)

"In certain cases, they were so disillusioned that they had to go to the local libraries to get material or get it through some friend".

The above remarks imply the neglect of one of the essential functions of the library -- fulfilling Law 2 of Library Science, which demands that the Librarian should know the needs of a reader and get his book from the nearest library in the world, in case it does not itself have it. Insdoc was established as a national agency to facilitate this work. Apart from this, the library should make the readers know that it is prepared to help them in this way. Insdoc too should make this service of it, well-known to the researchers in the country. To announce it once, is not sufficient. It should be done at frequent intervals. It is not merely "Scotch-Whisky" or "Lipton's Tea" that should be frequently advertised. It is even more important in intellectual service. The Insdoc and our libraries should be aware of this and act up to it, if they are to live up to the demands of Law 2 of Library Science.

24 Inter-Library Loan (203.3)

"If the library does not possess certain material then the librarian must see to it that the user is supplied with his requirements, through inter library loan".

This was widely practised by the Madras University Library even in 1930s. Here again, our readers should be constantly reminded of the preparedness of the library to get reading material on inter-library loan. We in Madras, used to find opportunity for this, while doing long range reference service. It is then that either the reader or the reference librarian, or both jointly become aware of the documents likely to be useful to the reader but not possessed by the library itself. In the Madras University Library, most of the inter-library-loans got started in such a setting.

241 Rules for Inter-Library Loan

About 20years ago, formal rules for inter-library loan were framed by the Indian Library Association. Again, at the request of the Inter-University Board, I furnished a set of rules for the same which were published by the Board. (See also my Library administration, Ed 1 (1935) Sec 635 and Ed 2 (1959) Sec 2635. These Rules were sent to the Inter-University Board on request and it adopted them). But I do not know how far inter-library loan is now practised by our libraries, either directly or through Insdoc.

242 Annual Statistics

The publication of annual statistical data on this will itself be a method of stimulating readers and libraries to use inter-library loan. Insdoc is probably the best suitable body to collect and publish such statistical data. It should ask each library to send to it a copy of the requisition for inter-library loan sent out from time to time. These can form the basis for annual statistics.

25 *Catalogue*

(194.3)

"It was found that ninety two percent of them said they could use the library catalogue effectively".

(197.1)

"Overwhelming majority regards Delhi University Library card catalogue easiest to use".

I am glad to hear that the Classified Catalogue of the Delhi University Library is found useful by the researchers and also easy to consult. For, between 1948 and 1954, when I was teaching in that University, I found it to be of sub-standard. I suppose that it has now been set right and that an adequate number of Cross References are given in the classified part, to the satisfaction of Laws 2, 3 and 4 of Library Science. Does each guide card in the classified part carry, in addition to the class number, its meaning in the form of feature heading? See Abstract and feature heading: symbiosis, Paper AF of DRTC Seminar (6) (1968). I trust that the Class Index Entries also are adequate in the alphabetical part.

26 *Circulation*

261 *Consultation (177.16)*

"Total number of persons who had to consult outside the field of Chemistry was 41".

This measure of consultation of document in penumbral region is a useful piece of information. It also indicates a healthy habit. (See annotation in Sec 221).

262 *Loan (186.3)*

"Sixteen persons ... borrow equally from [University library and Department library]".

Perhaps it is too low a percentage. Some public relation work should be sone to increase it.

263 *Return of Borrowed Books (199.11)*

"Research fellows mentioned that the teachers should be asked to return items on loan with them in time".

The disease of a teacher, forgetting the existence of other people needing the documents borrowed by him but allowing it to lie idle on his table for an inordinate time, is well brought out by this complaint. A kind of prestige sense develops in the teacher in this matter.

2631 *Banaras Hindu University*

I enforced the "time-rule" on the teachers of the Banaras Hindu University Library. Some took it to the Vice-Chancellor as interfering with "their long established privilege". This habit came, because of the University Library Staff having been in the past in the habit of propitiating the most influential among the teachers, at the cost of others-- even to the extent of the violation of the Rules of the Library. But Sir S Radhakrishnan, Vice-Chancellor, did not entertain their complaint.

2632 *Madras University Library*

In the Madras University Library, this was solved amicably as follows:-

1 Books borrowed by a teacher on his own personal tickets should be returned within the time prescribed by the Rules for individual members; and

2 Books wanted, for a long period by a Department, were lent out on Departmental tickets (75 for each Department). Such books were returnable, according to the Rules, only on the last day of the term, but were subject to recall earlier by the University Library. See also annotation in Sec 223. This arrangement minimised the difficulties arising out of "Seniority-Prestige-Protocol".

264 *Bespeaking Books (200.1)*

"The facilities for the reservation of books came under severe criticism. The purchase of multiple copies of textbooks was suggested".

The period of loan of a book, that is heavily bespoken at certain times, should be reduced suitably to give a chance to all— even to the point of over-night issue only, and making it available for study in the library during day time. When this does not meet the situation, duplication should be thought of subject to a proper use of the finance available. The determination of the break-even-point, between the two methods of meeting the situation, will depend on the context of each book.

265 Hours of the Library (189.1)

"They [research workers] mentioned that foreign libraries are open for longer hours".

According to Law 1 of Library Science, the ideal is to allow a reader access to the library at any hour, in the day or in the night.

2651 University College, London

I saw this ideal virtually attained by the Library of the School of Librarianship of the University College (London). Like any other participant of the School, I was given a key of the Library against a deposit of ten shillings. My Hostel was next door to the University College. This enabled me to read in the Library till mid-night on many of the days (See Sec 144 of my Five laws of library science, Ed 2 (1957).

2652 Fergusson College, Poona

R S Parkhi, Libraian of the Fergusson College, Poona, carried away the palm in India by keeping its library open from 8 am to 10 pm on all the days of the year. This fact was mentioned to me, a few weeks ago, by Mr Tukol, Vice-Chancellor of the Bangalore University, and till recently Judge of the High Court of Mysore. And he described with joy how this arrangement enabled him to do his M A Course without himself buying many books.

2653 Madras University

Madras University Library came second. When I was its librarian, its hours were 7 am to 8 pm on all the days of the year-- no Sunday or any other holiday. I learn that Law 1 of Library Science has now been pushed aside by that library, to some extent, in the matter of library hours.

27 Reference Service

271 The Homonymous Term 'Reference Service' (176.5)

"The important services provided by the University Library are: ... reference service".

Citation, in the Survey, of some typical examples of reference service would have been of use. For, the term 'Reference Service' is a homonym. It can mean either "Ready Reference Service" or "Long Range Reference Service". The latter does not seem to be practised in many libraries, especially by those who have taken training in the Far-West.

2711 Example in Delhi University Library

Example 1 - In 1950, one of the old students of the School of Library Science of the University of Delhi had just completed his Masters Course in Library Science in USA. I visited USA at that time. I found him stranded there. I arranged for his return to India. I also wrote to Das Gupta, Librarian, University of Delhi and also an old student of mine, that he might be taken into the University Library Staff. When I came back, I found a strange situation. In the old building of the University Library there was a spacious control enclosure. I found the America-returned student of mine seated within that enclosure. He had collected some of the ready reference books in the Library, and had them arranged in his desk. I asked the Librarian, "What is the work you have given to the person about whom I had written to you?" The reply was, "He said that he had specialised in Reference Service in USA, and that he would like to do that work. He was too overbearing to take any suggestion from me. Therefore, out of deference to your letter, I allowed him to have his way". I asked, "Is that why he is sitting within the control enclosure, instead of moving about in the floor of the stack room? This is not a business library or a public library. The ready reference questions arising here are few and far between." I thought that the only way of giving relief to the University Librarian was to send out the "America-returned Reference Librarian". At the same time, I did not want any harm to happen to him. Therefore, I had him accepted by the local American Library. What happened there is another story. It does not concern us here.

2712 Another University Library

Example 2 - About two years ago, a "Reference Librarian" of a big University Library called on me. He was a stranger to me. After putting him at ease, I told him, "You have the most human and rewarding job in your library". "No, Sir", he replied, "My life is one of boredom. In fact, I have come to consult you about it. Though, thanks to your efforts, all the reference librarians in our library are having salary-satisfaction, but I do not get work-satisfaction". I said, "This is contrary to my experience. If Reference Service does not give work-satisfaction, what else can?" He replied, "From morning to evening I have only to refer to the Calenders of a few Universities, including ours-- all assembed on my desk-- and answer questions about admission qualifications, examination fees etc. In many hours I do not even have such questions, to answer. But all the same I am obliged to pin myself to my seat". On finding from him that there were a few other "Reference Librarians" in that Library, and that they were working in the stack room, I asked, "Why don't you exchange your work with theirs". Then came an astonishing story from him, "There plight is even worse than mine. I am atleast able to see the faces of readers passing through the control region. But, my poor colleagues do not have even that advantage; for, readers have no access to the stack room. The work of my colleagues there is to pick out the books for which slips are brought by the peon and send the books through him. Another piece of work for them is to replace all the books brought back by the peon to the stack room, from time to time".

It is such experiences as this that makes one call for a little spelling out of the term 'Reference Service' with the aid of a few actual examples taken from the Reference Service, done by the Central University Library in Delhi.

272 Long Range Reference Service (203.2)

"Uptil now, in India, we have been providing traditional services in libraries. We should go beyond this and think of providing new services in the form of intensive reference service".

The term Brought into use, as early as 1926, to denote intensive reference service is 'Long Range Reference Service'. Every general statement has an exception. The phrase 'uptil now etc', in the quotation given above, has also an exception. As far back as 1926, Long Range Reference Service was introduced in the Madras University Library.

2721 Madras University Library

It had first to be demonstrated for two years. This had to be done by me single handed, as there was no staff for it; and I could do it because the daily number of visitors continued to be very small until this new form of service came to be known widely. By 1927, it was possible to get full-timed posts for Long Range Reference Service. Eventually, out of the staff of fifteen posts in the library, five went to Long Range Reference Service.

There was no need for a full-timed ready reference librarian. The few cases of a ready reference nature, happening in the University Library, could be looked after by the Long Range Reference Librarians. Further, the readers had been trained to help themselves with the ready reference books kept at the very beginning of the general Reading Room. None of our reference librarians had any desk work. They had to receive the readers coming to the stack room, find out their requirements in precise terms, and put them on to their documents, check up at intervals by going into the Reading Room, and find out if the readers were satisfied or if they wanted anything more. Whenever I could find time, I used to join the reference staff; because it was the most enjoyable and human work in the library. This "Intensive Reference Service" was continued throughout my period in the Madras University Library.

2722 Banaras Hindu University Library

During the short period, I worked later in the Banaras Hindu University Library, the first few weeks had to be spent in re-arranging the book-racks so as to suit open access service. Then the catalogue had to be re-formed so as to serve Long Range Reference Service. There was hardly any member of the staff capable of giving Long Range Reference Service to individual readers. The only two graduate staff were not accustomed to do it and they had become too rigid to start doing it. Still, something was attempted before I left that University.

2723 Delhi University Library

I remember Garde, Parthasarathy, and Ramabhandran doing Long Range Reference Service in the Delhi University Library, when I was teaching Library Science there. I hope that this tradition is even now being continued there.

273 Satisfaction with Present Service in Libraries (204.5)

"Some of the [readers] thought that the present libraries were serving them too well, naturally their expectations were too low".

One should perfectly agree with the second part of the above statement. A great handicap, which denies stimulus to the library profession to improve its service, is the readers not knowing what can be and should be expected of real library service.

2731 Supply Before Demand

This is the stumbling block in the progress of the librarians "growing in their profession". This is a case of supply first and demand later. It is generally so in giving service in the matter of intellectual hunger, as against physical hunger. The library profession should be aware of this. It should "almost aggressively" thrust their service on readers, even as a capable salesman does".

274 Training of Readers in the Use of Library Tools

2741 Under Graduates (199.1)

"At present, at the undergraduate level, the students mostly consult textbooks, for which they do not need any special skill".

This is an unfortunate mistaken notion prevalent in our country. But, as far back as 1926, the Madras University Library had a special programme of initiation of fresh men and also helped them in the choice of textbooks and collateral books. This was continued throughout my period. Years later, students of those days, employed in different levels of offices, used to meet me off and on in Delhi and other places. It was rewarding to hear from them that the help they got in this matter, as under-graduate readers in the Madras University Library, had helped them in the use of other libraries in their later life. And they also used to say that they were surprised to find that no such help was given in other libraries to their sons and daughters.

In Sec 5313 of my School and college libraries (1942), I have given an outline of a Concentric System for such help to be given to the students in school and college libraries.

2742 Research Workers (193.2)

"Those [research workers] who seek assistance ask to locate a book or a current periodical. Hardly anybody seeks assistance of any other kind".

This is a case where "supply" should provoke "demand". There should be agressive offer of help and also a good demonstration of help, to each research worker.

2743 Method of Training (199.2)

"Perhaps, literature seminars, special lectures, and short courses with guided experience could be organised to [train research workers]".

"Lectures", God forbid. When are we going to get disillusioned about the utility of formal lectures developed in our educational system during the last one century. Mass lectures help neither the trainer nor the trainee. Training of research workers should be only "individual".

"Seminars": This is a much abused term, probably under the influence of the Far-West. In reality, a Seminar should be a "coming together of near-equals in a subject, each with his own contribution, for discussing a specific subject area". Training of research workers will not lend itself to "Seminars".

The correct method of training of research workers should be severely individual and pragmatic. On each occasion a research worker brings up a problem for searching documents in the library, he should be in a gentle way exposed to a trilogue between himself and the reference librarian on the one side, and the library catalogue or the documentation list, on the other. In this process, the research workers should never be obliged to be idle. He must be led on from the alphabetical index entry with any constituent term in its - Subject Heading, he may mention (it is bound to be a multiple subject heading in the case of a research worker), to land on that region of the classified part of the catalogue or the documentation list, that presents an Apupa Pattern of entries bearing on his subject (See Sec QB7 of my Prolegomena to library classification. Ed 3. 1967). This Apupa region should be arrived at by trial and error. In this trial and error method the reference librarian should facet analyse the problem brought up by the research worker until all its facets and the respective faci in them could be formulated jointly by him and the research worker. To do this work, the reference librarian should be an adept in "Psychology-in-Action". A detailed account of this is given in my Paper, Formal vs

Pragmatic training of users, being presented to the forthcoming FID Congress (1970) at Buenos Aires.

275 *Training of Reference Librarian (204. 5)*

"All indications are that the number of students, research scholars, and teachers, and the amount of information are increasing rapidly ... Are our library schools in a position to train persons who would be able to face the challenge presented by [these] changing conditions?"

The pathetic answer to this question is, "Not as our Library Schools are conducted at present." It is time that the teachers of library science should take this to heart and re-think their duty to their students and to society.

2751 *A Priori and Pragmatic Training*

At one end, all kinds of library service -- past, present, and future---and the library techniques needed to make them efficient, draw their sustenance from the seminal roots-- the Five Laws of Library Science. At the other end, the "Individuating particularities" of the service and the techniques are determined by the service to be rendered to each reader in the choice of his documents - and this is "Reference Service". Therefore, library training should both be a priori and pragmatic. It should expose students plentifully to the task of rendering reference service, under guidance to begin with and later on independently also. The difficulties met with doing reference service will lay bare the improvements needed in library techniques. At this stage the value of the priori approach, from the seminal Five Laws will become clear. See paper D in Library science with a slant to documentation V7, 1970, Teaching in library science series 21.

2752 *Clinical Training*

This implies that the teaching of reference service should not be a mere dictation of notes, or reading from a book, and certainly not mass-lecturing.

The essence of training in reference service is clinical training in the floor of the stack room. This would present three phases:-

1 Phase 1. - The teacher himself does reference service to a specialist reader; each student observes this; and afterwards, the teacher explains to each student the route taken in doing the reference service, the difficulties met with, and the way they were surmounted;

2 Phase 2. - Each of the students of the group himself does reference service; the teacher observes it; and afterwards a discussion as in the case of Phase 1, takes place; and

3 Phase 3. - Each student does reference service by himself; after it, he brings up his experiences to the teacher for discussion, as in Phase 1.

2753 *Reference Service Makes Library Techniques Meaningful*

It can easily be seen that a student should have already acquired a fair knowledge of the library techniques, such as Cataloguing, Classification, Book Selection, and Document Bibliography, before clinical training is started. Of course, in the course of his clinical training in reference service, he will learn more and more of these techniques, of their importance, and of the value of the illumination received from the seminal Laws of Library Science. Thus, training in reference service is the coping stone of every branch of library science. And reference service is the summum bonum of library service. Books are bought, classified, catalogued, and bibliographies are built and bought all these labourius tasks become meaningful only while doing reference service. The students should be made to realise this fully.

2754 *Periodical Exchange of Reference Staff with Other Staff*

A corollary as an aside-- in a library itself. every member of the different sections should be given opportunity to do reference service at intervals, if he is temperamentally fit for it. Then only he can improve his own works. Reciprocally, the reference librarian, who exchanges his work with the member of any other Section who takes his place, will gain opportunity to improve his knowledge of library techniques.

2755 *Training in Psychology-in-Action*

In addition to the above, to do reference service with success, a student should be trained in "Psychology-in-Action". He should be trained, in action, to recognize and adjust himself to readers with inferiority complex, superiority complex, and traumatic complex. The following publications of mine will be of use in this connection:-

1. Reference Service, Ed 2 (1961), Sec D22 to D24; and
2. Psychology and the nature of work of users, a Paper being presented to the forthcoming FID Congress (1970) at Buenos Aires.

276 *Knowledge of Documents and Bibliographical Tools (202.14)*

"A librarian must become familiar with literature, bibliographical tools, literature search, etc, in the particular [subject] field and related areas".

This is a truism. But this is often forgotten. After acquiring some initial knowledge of the document, bibliographical tools etc, a reference librarian's knowledge of them will continuously grow like a snow ball, by the very process of doing reference service in the subject field. He must, of course, find time to familiarise himself with the appearance of nascent subjects-- particularly micro subjects-- in the subject field.

277 *Qualification for Rendering Reference Service to Specialists (204.2)*

"Department [of Chemistry] ... should... create a post of Documentation Officer ... he should be atleast an M Sc in Chemistry and hold a B Lib Sc degree".

For a daily average of 50 specialist readers seeking long range reference service, there should be one reference librarian. (See Sec K4 of the Report of the Library Committee of UGC (1965). It has been stated that the Department of Chemistry has a total of 110 specialist staff. There, it is likely that an average of atleast 50 of them will seek long range reference service in a day. Therefore the appointment of a Documentalist with M Sc in Chemistry, in the Department, may be possible. But on the professional side, the B Lib Sc degree will be inadequate. Either M Lib Sc degree with specialisation in Documentation, or an Associateship in Documentation of the Documentation Research and Training Centre in Bangalore, is necessary.

2771 *Doubtful Viability if the Number of Researchers in a Subject is Small*

But, such a thing may not be viable in any other Department in any of our Universities. The reference librarians will have to be drawn from different subject-groups instead of different subjects.

2772 *Acute Analytical Mind and Proper Training is Sufficient*

Till the salary scale of the profession was raised after 1958, my experience has been that no M A or M Sc, and hardly even B Sc, would care for the library profession. Only B A's joined the Course. I had experienced this from 1929 to 1954. This compelling situation led me to discover a very important fact. What is wanted in doing documentation work or documentation service in a subject is not a knowledge of the subject in the way in which a specialist has. A documentalist has only to develop the flair to grasp the layout of a subject-- even if it be in its wave front-- to identify new ideas (that is, isolates)-- appearing in the wave front and to relate them in a filiatory way with what exists already. In addition to an actute analytical mind, this requires a proper introduction to classification. I have developed it during all these years. And I have found non-scientists acquiring efficiency in dealing with any science. Sundaram of the Madras University Library, and Garde and Parthasarathy of the Delhi University Library, were outstanding examples. They were only graduates in Economics or History. Again, when Das Gupta was with me in Madras, he acquired this capacity with great ease, though his subject was History. This is because, he had an unusually analytical intellect. Saying this does not deny that a graduate in the science concerned is certainly preferable, if we can get him.

2773 *Survey of the Basic Subject of the B Lib Sc's of Ten Years*

In this connection, I should very much like that a survey is made of all the persons who had taken the Post-graduate diploma or B Lib Sc or M Lib Sc in all our Universities, during the last ten years, in respect of their basic subject in their prior degree course. Here a correction must be applied. In 1960, the B Lib Sc students of the University of Delhi came to meet me at the Indian Standards Institution. Some of them said that they had an

M Sc degree. I asked them if their own subject did not interest them any longer. They said that they did. Then I asked them why they changed over to the B Lib Sc course. The answer was revealing. They said, "We are not keen about it. But our fathers asked us to change over because, as a result of your own effort, a library post has been put on a par with an academic post in a University in respect of salary-scale but that there was little or no work in a library"! Science graduates who had taken the B Lib Sc course with this idea should be excluded from the count, unless they later developed true interest in the work of the profession.

2774 *Professional Men not Joining Library Course*

In respect of professional subjects such as Engineering, Technology, Agriculture, Veterinary Science, and Medicine, DRTC has not yet been able to get even a single candidate belonging to these subjects. Thirty years ago, a graduate in Agriculture very much wanted to join my School of Library Science. But, he finally gave up the idea. Two years ago, an Engineering graduate brought pressure on DRTC to admit him. But after two months he went away, because he had a good offer within his own profession. These are hard facts to be faced in respect of the subject specialisation of a documentalist in his primary degree course.

278 *Public Relation Work*

2781 *Publicity Work (201.4)*

"Services being provided by the University Library have not been publicized sufficiently"

This is a great drawback. This should be immediately rectified. Good public relation work should be started without fail, and what is more, it should be continued without stop. Let me give an example: When I was in charge of the Madras University Library we used to make some thing or other about library service appear in the Dailies, atleast twice a month. Sometimes it would be a bibliography on some local or national events. Some times it would be a straight announcement of one or other facilities or forms of services available in the Library. Atleast once in a month there would be an announcement that the Library was opened on all the 365 days of the year from 7 am to 8 pm. I used to visit and address Associations in Colleges and Hostels, Bar Associations, and other Cultural Associations once or twice a month to "sell" the service of the library.

27811 *Public Relation Work to the Repeated without Stop*

In spite of this, even after 15 years, people would ask, "Is the library open on Sundays?" or "Can I get any help in getting relevant documents on a Thesis I am writing or on a lecture I have to deliver?" This proves that the library should not be afraid of publicity work, but should go on repeating it. without stop.

2782 *Circulation of Accession List (202.3)*

"Circulation of an accession list is the least a library can do towards dissemination of information".

It is presumed that "accession list" means, "list of books accessioned" and not a documentation list. If so, this is an essential part of public relation work. It can produce the best result if it is a classified list. In the Madras University Library, we used to publish in the Dailies a classified accession list every week, and also send copies of it to all Colleges, and certain cultural institutions. This was done every Saturday. On the next Sunday several persons used to come to the library with a cutting from the newspaper, peruse the new arrivals, and bespeak what they wanted to take on loan after a fortnight. I learn K A Isaac of the Kerala University Library is following this practice.

28 *Library Administration*

283 *Periodical*

2831 *Acquisition (202.1)*

"The library should try to get more [periodicals] by air".

There is no doubt that this will be ideal. But it is a question of finance. Information should be furnished in the case of a periodical of average size now being got by air, about its annual subscription, and the annual cost of air post or its freight incurred in getting all its issues for a year.

28311 *An Alternative Measure for National Economy*

It also needs consideration, from the point of view of the economy of all the University, and Research Libraries of the country taken as a whole, whether the revival of the Insdoc list and each library getting a microfilm copy of only those articles in immediate demand, and if research work will be held up if one has to wait for the arrival of the original by Surface Mail. We should also consider in this connection, the average number of weeks elapsing within the publication of a periodical and the receipt of its issues in India by Surface Mail.

28312 *Information To Be Got in the Time-lag in getting the Issues of Periodicals by Surface Mail*

Before World War II, the periodicals were received by the Madras University Library within two weeks from Europe, and after a little more time from USA, This was secured by insisting the suppliers to send the periodicals by Mail-Ship, instead of by Freight-Ship. Now, probably there is no Mail-Ship, therefore information should be made available about the present interval of time between the publication of a periodical and its receipt in India by Surface Mail.

28313 *Japanese Practice*

In 1958, I found the Japanese Documentation Centre getting an issue of each periodical, taken by it, through Air Mail. The Centre said that this was costly, but they had to do it because its Documentation list was an abstracting one and not an indexing one, as the Insdoc list was.

2832 *Display of Current Issues (199.1)*

"New issues of periodical publications should be placed on display by the same evening".

I would go further. They should be displayed within an hour or two after their receipt. Here is a description about what we were doing in the Madras University Library, when I was incharge of it. In those days all the foreign periodicals would arrive on the morning of each Saturday. The Post Office used to deliver them in a big Postal bag. This indicates the number usually received. The periodicals librarian and myself would be in the Library at 7 am. We knew the workers in what subject would come to the Library at about that time to peruse the new issues of periodicals. For example, the new renowned physicist Dr. S Chandrasekhar, who was an under-graduate during three years of that period, used to be one of the first readers to reach the library to peruse the new arrivals. The periodicals in those subjects would be first picked out. I would take about five minutes to glance through each issue one by one, to find out if there was any article about which the concerned scholar should be informed. Then the periodicals librarian would process it, and the peon will place it on the display table within ten minutes of its receipt. In this way, most of the new arrivals would have been placed, in this staggered manner, on the display table before 11 am, when the majority of the scholars, eager to peruse them, would reach the library.

If the arrival of periodicals is now staggered throughout the week and not in bag-full, once in a week, each day's arrivals can reach the display table even in a much shorter time. Why should it be delayed till the evening?

285 *Processing of Books (200.2)*

"The processing routines need to be expedited in case of books in much demand".

The normal period for the completion of the processing of the books received, is one week. But a book for which a demand has been registered, should be given a line-clear treatment and released within one day, if such books are not many. If a reader wants to have only a quick perusal of a new arrival and is prepared to wait for its release till the end of the week, he should be given facilities for this.

But there is a danger here. A teacher occupying a position of authority in the University would use his authority to go to the table at which the new books are received and ask for quite a number of them to be given line-clear treatment. Such an unreasonable demand does happen. I shall give one instance.

2851 *An Example of an Unreasonable Demand*

In 1944, I was a guest of a Research Institute in Poona. The Director and the staff invited me for lunch. The Director said that he wished to use the occasion to discuss library problems with me. I then insisted that the librarian also should be asked to join us at lunch. The Director agreed. But some of the senior research workers did not like it very much. In spite of this, the librarian joined us. Each of two seniors complained, "I often find that about 20 or 30 books intended for my Department arrive at the Library on a certain day. But the librarian does not release them for a week. This is atrocious". I asked, "Do you want to use all of them at once?" He said, "Not exactly so". "Then why do you want all of them to be released immediately", I asked. The naive reply was, "Because they belong to my Department". Then I turned to the librarian and told him jokingly, "You are tactless. You should not allow the senior research workers to enter into your processing room, even as nobody is allowed to enter into a green room". There was a hearty laughter, though the two seniors were too glum to join in the laughter.

288 Maintenance Work

2881 Misplacement (199.5)

"Many a time [books] were misplaced".

This should not be allowed. There should be systematic shelf rectification — both casual and systematic. If there are reference librarians, they should detect misplacement and rectify it as pick up work in their free movement on floor duty and in the course of actual reference work. In the much used part of the stack room, shelf rectification should be done by each member of the library staff (other than of the Circulation Section) for about half an hour each day, in the region assigned to him. In the infrequently used regions of the stack room the Maintenance Section should do shelf rectification. In fact, the Maintenance Section should combine the weekly routine shelf rectification and stack verification in the region of the stack room allotted to the week. (See Sec 2833 of my Library administration, Ed 2 (1959).

2882 Binding of Volumes of Periodicals (199.10)

"The late return of periodicals after lapse of several months from the bindery was underlined [by research workers]".

A batch of volumes for binding should be sent out to the binder on an appointed day of each month. The agreement with the binder should stipulate the period to be allowed for each batch to be bound and returned. This period will depend upon local conditions. It should not ordinarily exceed two months. But, it can be one month in many cases. This was the time allowed by the Madras University Library during my period. In addition, the agreement should contain a clause for "Express Binding" of the specified volumes, when needed. It should also contain a clause that a research scholar needing urgent consultation of a volume in the bindery should be allowed the freedom to consult it there. These provisions were working satisfactorily in the Madras University Library.

Further, after the bound volumes are received, the routine of verification and other details will take one to two weeks for each batch. Here again, line-clear treatment should be given to such of the volumes as are in urgent demand to a research worker.

29D Documentation

29D1 Appetising the Research Students (182.9)

"One Professor goes through Chemical abstracts, Current chemical papers, ... and marks the items of interest with the initial of the names of the scholars to whom it might be of interest".

This is very good; but the documentalist should be able to give much relief to the Professor in this matter. This he can do by preparing and sending copies to each worker a weekly documentation list including only articles bearing, directly or indirectly, on the work in progress in the Department. The documentalist should do this as soon as the periodicals arrive in the Library. This will be months earlier than the arrival of the Chemical abstracts.

29D2 Offer of Professor to do Documentation Service (200.5)

"One senior Professor was of the view that senior teachers should volunteer ... for providing information ... to readers".

This is a wonderful offer. But, can the Professor afford to do this systematically? This is really the job of the reference librarian. He may, of course, consult the Professor in difficult cases. It should be considered whether the cost would justify the Professor doing this or the Documentalist.

29D21 Research Consultant of the Library of Congress

I remember the Library of Congress (USA) once had a team of research consultants. It maintained a panel of retired specialists who were willing to do difficult cases of documentation service, as a leisure time occupation, when specially called for. Is it wise to make an active research professor to do this work systematically? This is quite different from a Professor calling the attention of the research worker casually something of importance. (See Chapters A1 to A5 and particularly A4 in my Reference service. Ed2. 1961).

29D3 Seepage in Periodicals (183. 1)

"Those whose work is of interdisciplinary nature occasionally depend on their colleagues and friends in other areas [to know what they should read]".

It is a healthy, natural welcome habit. But in this problem on seepage the documentalist can do much. For, his weekly classified select documentation list will bring out to the notice of workers, all such seepage cases by giving multiple entries under different subjects, wherever necessary.

29D4 Reference Librarian: A Partner in Research (205. 5)

"The University Library ... should try to know about the research programme ... in advance"

This is an essential function of the University Library. The reference librarian concerned with the subject of the research department should do this informally but systematically, by being in close relation with the research workers. It is by doing this that the reference librarian can give his best service and it is in this sense that he will become a "Partner in Research". This work will involve a good deal of tact. Much of the success of this work will depend upon the geniality and personality of the reference librarian. This kind of work is commonly done by all business enterprises through their Sales Promotion Staff.

29D5 Documentation: Fringe Area: Translation

29D51 Self Translation (184. 7)

"One teacher ... was able to understand the relevant portion [in an article in Spanish] even without knowing the language".

This is quite possible in subjects rich in international symbolic languages and terminology-- such as Mathematics, Physics, Chemistry, and perhaps even Medicine. When I was a student, I was myself able to read Mathematical books in French and German, though I knew nothing of their apparatus words and syntax. But, as a subject recedes from the Natural Sciences, this would become increasingly difficult, if not impossible.

29D52 Ph D Students learning Two Languages (184. 10)

"Each Ph D Student should ... learn two foreign languages."

This is wroth doing if it can be done without prejudice to the concentration on his own subject of specialisation. About half a century ago, the medium used was largely one of the three languages, English, French, and German. At that time many research scholars acquired familiarity with two of the languages, other than the mother tongue, to the extent necessary to follow articles in their respective subjects. This process of learning was usually clinched by a research worker by spending a few weeks with his peers in the countries of other languages. For example, G H Hardy told me in 1925 that he used to spend a couple of months of his Summer holidays in some years with Edmund Landau in Germany, who was specialising in his own subject. Landau also would reciprocate. This was possible on account of the proximity of the countries concerned.

But now, several other language have gained importance— Semitic, and Asian. Some of these are gaining so much importance as media, that they elbow out one another. Each research scholar may at best learn one or two languages, and should depend on translators for other languages.

29D53 Compulsory Course in Foreign Languages for Lib Sc Students (203. 5)

"Students of library science [should] learn foreign languages".

This idea was prevalent about half a century ago, when library science and techniques were virtually static.

In my own case, when I joined the School of Librarianship of the University College (London) in 1924, there was an enormous linguistic load in curriculum -- English literature, French, German, and Indian or European palaeography. In about three weeks, I sensed that there was much to do in library science itself, if I was serious about it. I, therefore, asked Berwick Sayers, and the Director E A Baker, to exempt me from the language part of the course. When my quarterly report was sent to the University of Madras through Sir Mark Hunter, who had been asked to arrange for my course in London, an explanation was asked why I was not learning French and German. This was referred to Berwick Sayers, by Sir Mark Hunter, and he gave a slashing reply which silenced the University. In later years when library science was developed at a rapid rate, Berwick Sayers used to refer with supreme satisfaction to my having been saved the distraction of learning German, French, and Palaeography.

29D531 Example of the Indian Institute of Science

The advertisement for the Librarian's post made by the Indian Institute of Science (Bangalore) in 1925, mentioned the qualifications as:-

" 1 Proficiency in two or more European languages essential; and

2 Familiarity with library work desirable." "

In actuality, T Amrita Rao, my former Colleague in the Presidency College who was teaching Latin, French, and German, was selected. He had had no experience in library work. Two months after taking charge he came to me and said, "My work is all translation. I cannot manage the library. Can you give me one of your able Assistants"?

29D532 Persistence of the Tradition

This tradition would not disappear easily. As late as 1947, the post of the Librarian of the National Library in Calcutta felt vacant. I was then teaching in the Department of Library Science in the University of Delhi. It was then somehow believed that I would have much say in the selection. Therefore, a Professor of Sanskrit came to me with notes of recommendation from high placed persons like Sir Maurice Gwyer. His ground for his suitability for the post was somewhat as follows:- "I have much teaching work to do. But my chief interest is in editing and translating manuscripts in some Indian Languages. Teaching handicaps me in this work. If I am appointed as Librarian of the National Library I can devote all my time to this work" ! I had to disillusion him, by stating that stepping up library service and the research necessary for it would occupy the full-time of a librarian.

Even as late as ten years ago, a librarian, who had never done any work in library science, and indeed did not believe in the existence of such a science, used to insist in Committees that Competence in editing and translating manuscripts, was an essential qualification for librarians. In one of those meetings a Professor in the Committee retorted, "I would like to do the editing and translation myself. I would never leave it to a librarian. He cannot know all the subjects in which manuscripts appear. Surely, the librarian must have his hands full with his own distinctive speciality."

29D55 Teachers' wives as Translators (184. 8)

"The wives of the University teachers ... should ... learn foreign languages".

This is a pretty suggestion, brimming with grace. But is it realistic? The domestic and sociological implications of this should be examined. However, this suggestion may work in stray cases.

29D56 Full-Time Translators in a University Library (184. 8)

"The library should employ full-time translators".

This raises two issues:-

1 Firstly, will there be sufficient work to make it economically viable?; and

2 For technical translation a triple qualification is necessary -- competence in the translated-from language, the translated-into language, and the subject of the document.

Remembering this it should be examined that how many full-time translators a University Library should have.

29D561 *Attempt in Humboldt University*

This three-fold competence in technical translators was being seriously considered by the Humboldt University of East Berlin, when I visited it in 1961. It was considering the diversification of the training of translators so as to secure the triple competence.

29D562 *Part-Time Panel System*

Neither the Insdoc nor the Viniti of USSR, which are National Pooling Centres, do find it viable to employ full-time translators for all languages. They have to depend upon part-time panel system.

29D563 *Insdoc and Translation Service (184.5)*

"If it is Japanese or a less known language even Insdoc may show its inability. In that case some people would request the local embassy to arrange for translation".

This would imply that there is not enough work in such languages even for including in the panel of the part-time translators a person competent in each of such languages. Taking the services of the Embassy, in such cases, is a reasonable course. I have had to do it occasionally even 30 years ago in the Madras University Library.

29D57 *Slowness of Service by Insdoc (184.5)*

"Some of those who have tried INSDOC indicated that its service was very slow".

I have also heard even a more damaging remark that the translation arrives too late for use. This is, no doubt, a serious situation. The causes for delay should be systematically investigated. Whatever cause is removable, should be removed. This is the responsibility of the Insdoc and its Committee. It is not proper to evade this problem and drift along.

29D6 *Documentation: Fringe Area: Reprography (200.3)*

"Australian High Commission was prepared to supply a micro-copy of any document from Australia".

This offer should be certainly accepted and tried out. But the need for reprographs of Australian documents will be very small. What about documents of other countries? This needs investigation. If the Australian experiment succeeds, other Embassies may be approached for similar help.

3 *Spots in the Sun*

Here are a few suggestions for the improvement of Survey reports of this kind, without in any way distracting from the usefulness of Krishan Kumar's Survey. In fact, it is the otherwise good quality of his work that has stimulated the writing of this Section on desirable improvements.

31 *Idea Plane*

311 *Principle of Unity of Idea*

The Principle of Unity of Idea should be observed in each of the structural elements -- the sentence, the paragraph, the sub-section of any order, the section, and the text as a whole.

312 *Helpful Sequence of Idea*

The Principles of Helpful Sequence should be followed for the arrangement of idea among the sentences in a paragraph, the subsections of a section, the sections of the work, in short, in every structural element of a work. For a list of the Principles for Helpful Sequence, See Chap BD of my Prolegomena to library classification. Ed.3 (1967).

32 *Verbal Plane*

The following principles should be observed in the verbal plane:-

1 Principle of Demarcation - The expression of the content of each structural element should be kept clear of each other and not made to overlap;

2 Principle of Simple Sentence;

3 Principle of Transparancy;

4 One-one correspondence between term and idea;

5 Avoiding Homonyms;

6 Avoiding Synonyms;

7 Use of Technical Terminology, where available;

8 Consistency in Presentation;

9 Any new term absolutely necessary should be defined; and

10 Elegance in expression.

33 *Section Heading*

Each section as well as subsection should be given a brief heading, descriptive of its contents. This will be of immense help in referring to the article and picking up precisely what is wanted, with the least effort and waste of time. It will also be of help in the first perusal of the article as a whole.

34 *Notational Plane*

Each section as well as subsection should be given a number. It should be in pure decimal fraction notation so as to bring out the coordination and subordination of the sections and subsections. This also is of help both in later references and in first perusal.

35 *Index*

A long paper, such as this Survey, should be provided with its own contents page and index. As the Survey is, of necessity, long and of a sprawling nature, it would be difficult to locate any specific information wanted, without the aid of an index. The index number should be its section number and not the page number. If so the index can be prepared even at the press copy stage. In the Contents page too, it is sufficient to give section numbers.

351 *Detection of Repetition and other Errors*

The index will incidentally lead to the detection of repetition of ideas. For example, "the transfer of materials from the University Library to the Departmental Collection" occurs in Sec 176.1 and 176.2 of the Survey. These two could have been coalesced in a suitable way in one and the same Section.

36 *Cross Reference*

In addition to the index, it is also desirable to give Cross References within the text. Even here, the section numbers will make the cross references elegant.

37 *Indian Standards on Presentation of Text*

The above guiding principles for the presentation of the text of a book or of an article were the result of my experiment on the subject in writing my books and articles during 40 years. Then, as the Chairman of the Documentation Sectional Committee of the Indian Standards Institution, I requested the Institution to take up the Standard on this subject. The draft based on my experience was considered in several sittings of a Sub-Committee which included a printer. The contents of the draft were also brought to the notice of industrialists, businessmen, and certain other groups of persons, at meetings arranged by them. They all welcomed the proposed Standard and declared that it would be useful in their own writings. By the time the draft standard completed wide circulation and was about to be approved, I resigned my Chairmanship, because I had completed 50 years of public service. Thereafter, certain adverse circumstances prevented the adoption of the Standard in the form in which it was generally approved in wide circulation and on which much labour had been spent by several persons.

However, anybody interested may be able to get from the Indian Standards Institution copies of that draft Standard which had completed wide circulation. Even otherwise, the essence of the Standard could be found in the quarterly Library science with a slant to documentation, 5; 1968. It appears therein as Paper B, Books and articles: Guiding principles for presentation of text (Book science series. 1), by A Neelameghan.

38 *Technical Terminology*

It is desirable in a learned article, such as this Survey, that technical terms should be preferred to popular terms, wherever they are available. For example,

1 The term 'Periodical' should be used instead of the term 'Journal'; and

2 The term 'Document' should be used instead of the term 'Literature'. The term 'Literature' is a homonym. It disturbs the mind, while reading, by the suggestion of its several meanings. No doubt, it may be said that the context will minimise the disturbance. But, why this dependence on context, when this

disturbance can be completely avoided by the technical term 'Document', which is quite precise in its denotation. A technical terminology provides a neutral set of terms, removed from the Subconscious thought patterns.

39 *Back Log of Pre-Gandhian Mentality*

When are we going to give up the Pre-Gandhian habit of looking to beyond the seas for an authority even for obvious things? I can understand the old generation still sticking on to that old habit. But I do wish the new generation stands on its own legs. I am aware that the old generation is still importing outsiders at a terrible cost for what our young men can do much better and at a much lower cost. I know that the authorities of the Delhi University Library have become, during recent years, one of the worst victims of this outmoded habit. They do not realise how much the continuation of this practice frustrates and inhibits the young librarians of renascent India bubbling with enthusiasm, to do their best. The Survey could have found out the fact mentioned in its Sec 176.3 by itself, perhaps in a more accurate form. This does not mean that we should shut out windows against all good ideas coming from outside. But we should not keep the windows open only to receive travialities.

4 INDEX

Compiled by P JAYARAJAN, Research Assistant to the National Research Professor in Library Science, Bangalore, and by M A GOPINATH, Lecturer, Documentation Research and Training Centre, Bangalore.

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irt = In relation to
qirt = Quoted in relation to
rirt = Referred in relation to

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Table of Man-hours spent on the Preparation of this paper. Prepared by M A GOPINATH, Lecturer. Documentation Research and Training Centre, Bangalore.

	Work	N of persons	Hours spent	
			Individual	Cumulative
A	Writing Work			
1	Reading and making marginal notes of the Survey	2	10	
2	Organising the marginal notes	2	6	16
3	Preparing first draft	2	12	28
4	Reading and correcting first draft	2	12	40
5	Reading and correcting fair copy	4	36	76
B	Indexing Work			
1	Preparation of Index slips (400)	1	8	84
2	Checking with the text	1	2	86
3	Consolidating and preparing the manuscript	1	2	88
4	Revision of manuscript	2	2	90
5	Revision of final draft	1	1	91
	Total			91

(Continued)

293934

	Work	N of persons	Hours spent Individual	Hours spent Cumulative
C	Contents-cum-Abstract			
1	Writing the first draft on abstract	2	1.0	92.0
2	Revising the draft	2	0.5	92.5
3	Correcting the fair copy	2	0.5	93.0
D	Typing Work			
1	Typing first draft of paper	1	8	
2	Typing fair copy of the paper (40 pages)	1	8	16
3	Typing of index	1	2	18
4	Typing the faircopy of abstract	1	1	19
			Grand Total	112

The entire work on this paper was done in the course of one week (30 April 1970 to 5 May 1970).

Note: In all the jobs (A to C), the author participated. On account of his 45 years of experience in writing, one hour of his should be taken to be equivalent of 3 hours of others.

STANDARDS FOR LIBRARY EDUCATION IN BURMA, CEYLON, INDIA AND PAKISTAN

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Suggests a set of common standards for library education in the four countries. The maintenance of standards can be the responsibility of each country's university organizations like the University Grants Commission in India; the Inter-University Board or proposed University Grants Commission in Pakistan; the National Council of Higher Education in Ceylon; and the Universities Central Administration Office in Burma. As a prelude to the actual spelling out of the proposed standards a brief resume of the comparable practices with regard to standards for library education as they obtain in the United Kingdom, the United States and Latin America, is also given.

The period from Dickinson to Ranganathan has shown a strong British influence on the educational systems of Burma, Ceylon, India and Pakistan. In fact, the modern library movement as also that of modern education in these countries owe their existence to the "mildly beneficial administration" of British rule. This British influence is so deep-rooted that even independence did not diminish it. Burma attempted to make a breakthrough in 1964; but even so, it continues to follow the older patterns of education. Library education had, therefore, to fit within such a system of education.

Library development followed a similar pattern in each country. University libraries, although not developed simultaneously in all the four countries, received better treatment; more money was available for the development of their collections, and their librarians were sent abroad for training. British officials, who at one time found it expendient to send the book treasures of these countries to London, were responsible for the development of some of the important libraries in the area, which today, by and large, have become the nucleus of the country's library development. Among them were the former Imperial Library (now the National Library of India) in India; the Punjab Public Library in Pakistan; Colombo Museum Library in Ceylon; and, Bernard Free Library (merged with the National Library) in Burma. With the attainment of independence, and subsequent emphasis on industrialization, special libraries also appeared on the scene. However, despite the identical trends of development, there is an imbalance in the library situation of the four countries. While in India and Pakistan, the library development brought about the establishment of library associations to carry forward the good work done for the promotion of libraries, similar developments in Burma and Ceylon did not establish any association. Burma had to wait until 1958 to start a library association, and even that belated development was short-lived. (Possibly Burma's failure in this respect lies in its attempt to organize a national library association instead of starting local associations, such as in India and Pakistan, to prepare a professional climate in the country and to ensure effective cooperation among the librarians.) Ceylon took another two years to found a national association on the island. The smallness of the country and the government's support, however, enabled it to create professional spirit for the continued existence of the Association.

Thus lagging behind in professional activities, Burma and Ceylon also lacked a dynamic leadership, such as in India. The university libraries in both countries, although relatively as well organized as their counterparts in India and Pakistan, failed to provide any leadership while this much needed leadership in the neighbouring countries had swung

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The paper is based on author's Ph.D. thesis submitted to the Faculty of Graduate School of Libary and Information Sciences, University of Pittsburgh, in June 1969.

the pace of library development to the advantage of the entire profession. The Madras University Library was instrumental, among other things, for the passage of the Madras Public Library Act; Pakistani Universities, within their limitations, contributed to the development of respectable programmes for library education.

The retarded development of libraries in Burma and Ceylon had adversely affected the library education programmes of these two countries as well, and their failure was largely due to the departure from the pattern established in India and Pakistan. Library education in Burma began with partial programmes. In Ceylon it was started simultaneously both by the university and professional association, while in India and Pakistan early attempts were directed at starting junior levels of training both by the universities and the professional associations. When respectable status and salary was established for the librarians in these countries, then only degree courses were started; graduates were able to get suitable jobs commensurate with their qualifications, Thus it was possible later in both the countries to offer even Ph.D. programmes.

However, the library developments in all the four countries took their directions from one common sources, i.e., the colonial administration. The force and vitality of these efforts were more or less the same. Only the prevailing professional attitude in each country brought about different results. To catch up with India and Pakistan, Burma and Ceylon will have to learn from the experiences of their neighbouring countries. For one thing they must learn that professional post-Bachelor's courses at university level are as important for both Burma and Ceylon as they are for India and Pakistan and, for that matter, elsewhere in the world. Once library training classes at universities are started in Burma and Ceylon, they would not be placed differently from India and Pakistan; since the systems of education in all the four countries bear strong similarities. Also because the trends of library developments are closely identical, a common set of standards for library education at university level, could be applicable in all the four countries.

Guided by these similarities, the UNESCO Regional Seminar on Library Development in South Asia, Delhi, October 3-14, 1960, even recommended setting up a regional library training centre for South Asia, in which connection Delhi was mentioned as an appropriate location for such a purpose in the message to the 1960 UNESCO Seminar at Delhi by the then Director-General of UNESCO, (Delhi has also been suggested as a possible campus for the ALA's proposed International Library School) [1]. More recently the 1967 Colombo Meeting of Experts on the National Planning of Library Services in Asia also made recommendation for a regional training centre [2]. Karachi was also recommended by the U. S. Aid Book Survey [3] to serve as a Regional Centre for Advanced Library Studies and Research not for South Asia but for the countries of CENTO [3]. Such regional training centres are not uncommon in other parts of the world. Two such centres are already imparting education in Africa under the assistance provided through UNESCO: (1) the Dakar Regional Centre for Training of French-speaking Librarians; (2) the Kampala Regional Centre for Training of English-speaking Librarians [4]. In Latin America the Inter-American Library School at the University of Antioquia in Medellin performs the same function but under an International Executive Council consisting of the representatives of the University of Antioquia, the National University Fund, the Columbia Library Association, UNESCO, the Organisation of American States, the American Library Association and the School's Alumni [5], until the School was fully incorporated into the university. A Council of Library Training in East Africa also exists at the Kampala Regional Centre but has failed to produce any useful impact on library education [6]. While a regional training centre for the four countries under study or a regional council for library education may seem desirable, the current political relations between them would, however, make it difficult to undertake such a joint venture. Although, it has not been unusual for Indian schools to receive a few trainees from Burma [7], Ceylon and Nepal in the past, extension of such a practice on a large scale and on a continuing basis leaves much to be desired. It is likely, therefore, that training facilities within each country will develop independently of each other. For a closer collaboration between the library schools in the region, it may, however, seem useful to organise an association of library schools in the region on a purely professional and non-political basis. If such an association is formed it should concern itself with common problems in library education. The Asia

Foundation, UNESCO, and other agencies, may be interested in providing financial assistance to defray its organizational and administrative costs.

Despite the difficulties in evolving a joint mechanism, a common set of standards, as pointed out earlier, could be acceptable and maintained because the authority to do so would be vested in each country's university organization. Political disparities, in whatever from they continue to exist, would not affect the application of standards.

These standards and some sort of mechanism to enforce them are all the more necessary because the findings of this study confirm the continuance of the earlier attempts which were beyond any doubt influenced by the British pattern. The existing inconsistencies, as have been indicated by the findings, however, are the results of the arbitrarily structured programmes at various schools with misplaced emphasis. Bombay, Calcutta, Jiwaji, Kerala, Poona, Shivaji, and SNDT, for example, offer course on general knowledge; and almost all the schools in India spend most of their teaching hours on classification and cataloguing. The large number of part-time teachers in the library schools of India and Pakistan is also a legacy of the past when a few trained librarians had also to undertake responsibilities for training their staff.

Besides these limitations, the library schools in the area are under financial and physical strains. Karnatak, Poona and Punjab (India) have budget appropriations ranging between one and three thousand rupees (approximate U.S. $ 130 and $ 390). Similarly most of the library schools, located in the university libraries, suffer from inadequate physical facilities. Library resources equally tend to be neglected because of the non-availability of separate funds for that purpose.

With inadequate facilities and resources in India and Pakistan, there is great danger of sub-standards creeping into the system. For this reason, some control should be established to check against sub-standards. Such a control could also be feasible in Burma and Ceylon because of the similarities of educational systems and trends of library developments. Consequently, the study has concluded that such a control should be vested in the University Grants Commission in India; Inter-University Board or the proposed University Grants Commissions in Pakistan; the National Council of Higher Education in Ceylon; and the Universities, Central Administration Office in Burma. These university organizations, although different in structure, have the authority necessary for the maintenance of standards. For the success of the projected control it is necessary that there should exist a set of common standards which could be enforced by the authorities mentioned earlier. Since without such an authority to enforce, standards would not be acted upon. These standards may not bring quality in the programmes right away but they would certainly bring about improvements in the existing practices making stipulated goals, set out in the standards, a possibility in the future.

The proposed standards are not definitive; neither are they magic beads that would bring an end to the problems of library education, when thrown in/the fire-place. These standards, if properly enforced, would bring about improvement in the existing situation and, therefore, need to be reviewed periodically. The standards are qualitative. The quantitative standards may not be effective since the attainment of the stipulated goals may be irrelevant of quality.

The standards for library education in the United Kingdom, the United States, and Latin America and those developed by this study, for Burma, Ceylon, India and Pakistan, show strong similarities in the areas covered. One is, therefore, struck by their commonness. It seems obvious that education anywhere in the world would be concerned with faculty, curriculum, teaching methods, physical facilities, etc. and, for that reason, qualitative standards would tend to be identical everywhere. Perhaps, the standards for South Asia could also be applied in other countries.

The only difference one would observe in the case of South Asia is its emphasis on the separation of the library school from the university library. Is this situation due to the considerations of savings in the costs that the university librarians continue to hold joint appointments in the library and library schools in the area? Should it remain so or should it change at a point where there is enough maturity in the programme calling for full-time attention of a director and supporting staff? Is the change in the quality and status of library education in the United States and Brazil the result of the changeover from part-time to full-time faculty? Answers to these questions would make the standards, concerning faculty and administration of library schools, slightly different from those in countries which do not face similar problems.

The interpretation of the standards will, however, differ from country to country according to the local needs. For example, the emphasis on a second language in Africa will be different from that in Latin America or South Asia. So will be the case in the teaching of cataloguing and classification in as much as the treatment of local names and subjects are concerned.

In the light of the above conclusions, one may raise these questions: Do qualitative standards have universality? However, there is, understandably, a core of commonness in qualitative standards since education all over the world would be concerned with faculty, physical facilities, admission requirements, and teaching methods, etc.

Before discussing the standards for Burma, Ceylon, India, and Pakistan it would, however, seem desirable to examine the various practices with regard to standards for library education as they obtain in the United Kingdom, the United States and Latin America. The following discussion is, therefore, devoted to such practices in the areas referred to above:

United Kingdom: According to Bernard I. Palmer, "the Library Association does not require any member to take a course before submitted himself to the professional examinations, although it strongly advises this. As a consequence, it has never accredited courses as such, the proof of the pudding beging in the eating (or the examining in our case!)" [8].

In 1960, however, a dramatic change was evident in the Association's attitude when it approached the "University of Sheffield to ask if it would consider establishing a post-graduates school of librarianship" [9]. In 1962, the Association's Education Committee set up a Sub-Committee "to examine and report on the whole matter of recognition, in relation to the Registrar of internal examinations in librarianship, and diplomas issued in respect of them conducted by bodies other than the Library Association including methods of control by the Library Association of internal examinations" [10]. The Sub-Committee recommended a scheme of safeguarded internal examination for which schools meeting a set of minimum standards prescribed for the purpose are required to put in an application to seek permission to examine internally on behalf of the Association. This scheme also required appointment of 'visitors' to report on schools applying for internal examination. The grant of this privilege is for "a stated number of years, renewal being subject to the approval of the Council" [11] of the Association. The visitors also report on the schools seeking renewal. By July 1968 only four schools out of eleven concerned applied for permission and all were granted it [12].

The application form, prescribed for the purpose of seeking permission for internal examination, require among other things, the following information:

1. Status of librarianship course, e.g., Department, School, etc.
2. Number of students currently enrolled
3. Number of students anticipated
4. Number of teaching staff (aggregated part-time staff may be counted)
5. Number of clerical staff per hour specifically allocated to the department of librarianship
6. For how many subjects in the Part II examination are courses being provided?
7. Method used to select
8. Accommodation
9. Library facilities
10. Teaching aids and equipment
11. Is the college library administered by a Chartered Librarian?
12. Facilities for practical training [13]

The minimum standards prescribed by the Association is based on broad principles and stress on equitable status of the school within the parent institution; high proportion of group and tutorial work for which the teaching staff/student ratio should be 1:10-with a minimum of six full-time teachers and good provision for part-time and specialist visiting lecturers; a minimum number of 80 students with sufficient residential and recreational facilities for them; adequate accommodation -- lecture hall to hold all student body; classrooms to accommodate all classes simultaneously; tutorial rooms, private study facilities; accessibility of teaching aids and library materials; arrangement for practical work in suitable libraries [14]. In the case of University schools, the Association is represented on advisory committee or (alternatively) shares in the appointment of external examiners [15]. These developments, according to C. Bradley, have given the Library Association "more powerful influence on their standards than it has ever possessed before" [16].

United States: Like many aspects of library education in America, the mechanism for accreditation for library schools began with the Williamson Report. The Board of Education for Librarianship, created on June 30, 1924 as a result of this Report, aimed at formulating standards based on the then existing situation rather than basing it on an ideal situation [17]. Thus established, its standards were designed to deal with four different types of schools. The 1933 standards, however, recognized three types of schools based on admission requirements and programmes. These standards were strictly quantitative. In 1948, the 1933 standards were suspended. A statement of policy issued by the Board of Library Education stated the following principles for setting up standards:

1. The purpose of accrediting is to improve the services of libraries through the improvement of the professional education of librarians.
2. The spirit of accrediting should be that of constructive evaluation of a library school.
3. Accreditation of library education programmes at the national level should continue to be coordinated through a single agency which is authorized by the members of the profession and representative of their interests.
4. An accrediting agency should draw upon the members of the library profession and professional library schools for advice and assistance in developing and administering standards.
5. In administering an accrediting programme in the field of librarianship, the accrediting agency should cooperate with accrediting groups in other fields in the general interest of improving higher education.
6. An accrediting agency should continually re-examine and revise its policies and procedures. In the application of standards it should avoid rigidity and inflexibility which would hamper general progress in the education of librarians.
7. An accrediting agency must evaluate the library school in its institutional setting.
8. The standards should be set in a framework which will permit a library school to initiate experiments in professional education and operate without conflict with the policies and organization of its own institution.
9. The standards should emphasize qualitative rather than quantitative criteria. Without setting up arbitrary specifications they should indicate clearly those levels of achievement which contribute to continuing progress in the education of librarians.
10. The standards should represent the minimums of achievements consistent with the needs of the library profession.
11. The standards should emphasize key criteria which represent elements of most importance in the professional education of librarians [18].

The 1951 Standards, when formulated, eliminated completely the classification of library schools by types [19] and since then they were keyed to five-year programmes only. Another significant change in the standards related to its qualitative natures. The Committee evaluates application for accreditation and consists of eight members including the Director of the Office for Library Education, Lester E. Asheim, who acts as ALA Staff Liaison. Application for accreditation is made in a report form giving factual information about the programme together with necessary evidence to substantiate the information. The information relates to the place of the school in the parent institution, curriculum, degrees, faculty and their publications and research, finances, physical facilities and library resources. A visiting committee appointed for this purpose visits the school for about three days and submits a report to the Committee based on its visit to the School. It is on the basis of this report that accreditation is granted or refused.

The minimum standards for the accreditation of library schools, as established by the Council of the American Library Association, deal with organization and administration, financial status, faculty, administrative and non-instructional staff, curriculum, admission requirements, degrees, quarters and equipment and library facilities and services. Based on broad principles, the current standards adopted in 1951, for organization and administration, faculty and library facilities and services read as follows:

Organization and Administration

The Library school responsible for the programme of library education shall be an integral part of the parent institution and shall be assured of status and continuing financial support sufficient to carry out the programme in accordance with these standards.

The programme shall be administered by an executive officer empowered by the institution with sufficient authority to accomplish the objectives herein outlined.

The executive officer shall have qualifications similar to those required of the faculty and competence necessary to fulfill the additional responsibilities of his office. His academic status and title shall be appropriate to his position as judged in relation to the organization of faculty in the institution.

Faculty

The faculty shall be adequate in number, authority and competence to determine and to carry out a programme designed to achieve the objectives stated in these standards and other objectives of the library school.

The instructional programme must be the responsibility of a corps of full-time faculty sufficient in number to provide stability and continuity of instruction, to carry the major portion of the teaching load and to represent a variety of competencies.

Library Facilities and Services

Adequate library facilities and services shall be provided. The character and organization of the library of the institution, the special collections for the library school, and other local library resources, will be judged in relation to the curriculum offered [21].

The report resulting from the visiting committee contains a detailed analysis of the school's status in relation to the stipulated standards.

Even after accreditation a re-assessment of each accredited school has been customary, at an interval of ten years. But, since 1968, a continuing review has been adopted which takes place every year. An official reporting form designed for this purpose requires information with regard to significant changes that took place during the year; school's relation to its parent institution; curriculum; admission requirements; degrees; quarters and equipment; library facilities and services [22]. The report also requires information on new faculty members, budget, major faculty research and publications and outstanding honours received by the library school faculty, workshops and institutes sponsored by the school, and major changes under consideration.

Latin America: The rapid change in the library scene of Latin America has also increased the number of library schools in the area. There are thirtynine schools of varying quality in the region [23]. The three roundtables on the pre-service and in-service training of librarians organized by the Inter-American Library School at Medellin, during the period 1963-65, through a subsidy provided by the Rockefeller Foundation, brought about the formulation of a set of minimum standards for library education in Latin America [24]. Although the standards are qualitative yet they are elaborate enough to explain various details of professional education in librarianship to the university administrators who are not fully aware of the requirements of professional librarianship in the area [25].

Broadly stated, the Latin American standards suggest that the library schools should be part of a university system; entrance requirements should be the same as that of any university course; the titles of the degrees offered should be the Licenciado en Bibliotecologia (Bachelor in Library Science) and in the future when the condition demands a doctorate in library science; the teaching methods should include group discussion, case study, seminar besides the lecture method with increased use of audio-visual materials; theoretical instruction should be combined with practice work and visits to libraries; the students should possess an ample reading ability in English; the qualifications of library school teacher should be identical to the teachers in other schools and should include good general pedagogical training; the teaching staff should be employed on a part-time basis; a full-time professor should not teach more than 12 class contact hours a week to permit him to undertake research in librarianship; professors should be assisted by instructors and clerical assistants; the minimum number of full-time professors should be three including the director of the school.

The other standards require adequate provision of space for classroom, offices and faculty; budget allocation necessary to run the school on lines identical to other schools in the university; minimum collection of 2,000 monographic titles and complete runs of 40 periodical titles; one professional librarian and one assistant on the staff of a library school library; seating capacities for 25 per cent of the students in the library school's library.

The standards dealing with study plans prescribe 1,800 hours of class work plus practical and individual work spread over a period of three years. The curriculum includes 420 hours of general education; 1,020 hours of basic professional course, such as, introduction to librarianship (60 hours); introduction to library techniques (30 hours); history of books and libraries (60 hours); library administration (120 hours); book selection (45 hours); classification and cataloguing (300 hours); reference work (120 hours); bibliography (150 hours); readers and libraries (45 hours); research methodology (30 hours); and documentation (60 hours). The standards further prescribe that two elective subjects should cover 120 hours; while specialized courses and seminars should include four more courses of at least 60 hours each at an advanced level. The latter group includes special Problems of Different Types of Libraries, Advanced Studies in Administration, Advanced Studies in Cataloguing and Classification, Advanced Studies in Bibliography, Advanced Studies in History of Books and Libraries, Advanced Studies in Documentation, Planning of Library Services, Comparative Librarianship, Pathology of the Book, Teaching of Library Service, Periodicals and Serials.

However, lacking the necessary mechanism to enforce them the standards have not received a wider application as is evident from the Luis Floren's appraisal of library education in Latin America [26].

But a movement has set in Latin America which according to Maria Teresa Sanz resulted into still wider aspirations than reflected in the standards. She says, "Since then [after the formulation of standards] many schools have gone beyond these requirements [as prescribed by the standards] and their wider aspirations are expressed in the recommendations of a committee of librarians appointed by the Federal Council [on Education in Brazil] to study norms for post-graduate courses leading to a Master's or Doctor's degree" [27]. In Brazil, the Public Law of 1962, restricts the practice of Bachelor in Library Science from an officially approved school; those holding foreign diplomas are required their evaluation under this law [28].

Proposed Standards

It is evident from the above discussion that qualitative rather than quantitative standards are generally found; those adopted by the South African Library Association also fall under the category of qualitative standards [29]. According to Leon Carnovsky, ",,, even as early as 1933 [in the United States], the strictly quantitative criteria--so many library volumes, so many faculty members, so many credits--were deemphasized or omitted in preference to the qualitative, if more vague in exact standards [30].

Based on the experiences of the countries discussed above, it would seem that similar type of standards (i.e., qualitative) should prove all the more useful in Burma, Ceylon, India and Pakistan where existing practices in library education vary greatly among them. This difference in practices render a workable generalization difficult to base quantitative standards thereon. The measuring rod type of standards (i.e., quantitative) on the other hand are likely to negate the very purpose for which they are proposed— to improve the existing library education facilities - in countries like Burma, where a post-Bachelor's programme in library science is still a dream. The lack of public support for such a programme in Burma would make even more difficult to establish it under quantitative standards. The qualitative standards nonetheless are not permissive enough to cover sub-standards under their sheild and at the same time would not prohibit such pioneering ventures as at Lahore and Madras. And it is because of these early programmes that the establishment of full-time schools as at Madras, Delhi, and DRTC was possible.

For these reasons, the standards proposed below for the four countries are qualitative rather than quantitative. Even qualitative standards may be of two types. Those aiming at ideal goals might be purely theoretical and consequently might well be out of touch with reality. The other type of standards, conversely, might aspire to the highest attainable goals within the context of limitations in specific situations.

The earliest American standards have been called "down-to-earth" [31] since they too were based not on idealism but the existing situations under which they were formulated. But even such "down-to-earth" standards greatly contributed to the setting of the stage for the present standards (adopted in 1951).

The present standards for the four countries developed in this study are based on the existing limitations and practices of the library schools in the area, as revealed in the study. Within these limitations, the proposed standards set the highest attainable goals. Even though such goals may not seem high enough, from a theoretical point of view, they are formulated in the belief that they would bring about the improvement necessary to set forth higher goals.

Standards

1 *Place of Schools in University Setting*

The library school shall be an integral part of a university and shall enjoy the same status and support, both academically and financially, as do other teaching departments or schools in the university system. It shall be separate from the university library with its own administrative head of the department. The teaching staff shall hold academic ranks and enjoy similar privileges that are available to their counterparts in comparable teaching departments and schools.

The school shall be a full-time teaching department offering courses in the day-time. The school's status shall be such to guarantee sufficient independence for separate staffing and for membership on regular academic committees [32].

2 *Levels of Library Education*

The levels of library education within a university shall consist of:

1. *A one academic year Bachelor's degree in Lib. Sc.*
2. *A one academic year Master's degree in Lib. Sc.*
3. *A Ph.D. in Lib. Sc., where the condition demands.*

The Bachelor's degree course in Lib. Sc. shall be open to those holding a Bachelor's degree in any other area and shall aim at preparing librarians for beginning professional positions. The Master's degree course in Lib. Sc., on the other hand, shall be open to those already holding a Bachelor's degree in Library Science with at least one years' field experience after their first professional degree.

3 *Financial Status*

The school shall have a separate budget of its own including financial provisions adequate to maintain standards set out herein.

Such provision shall also include necessary funds for teaching aids, research and publications, library materials, faculty travel and student scholarships and fellowships commensurate with the types of programmes offered by the schools. The adequacy of the budget shall be judged in relation to the budgets of those schools offering comparable programmes. The adequacy of the salaries of the staff including the executive officer shall be judged in relation to those of the teachers of comparable qualifications and competencies in other departments of the university. A new programme shall provide for capital expenditure adequate to build up a base collection of books, teaching aids, and other necessary equipment.

4 *Faculty*

The faculty shall be adequate in number and competency to teach the types of courses being offered at the school

Primarily the teaching shall be the responsibility of full-time faculty; at the same time, part-time teachers shall be employed to teach special courses but they may not carry a full teaching load. The minimum number of both full-time and part-time faculty shall depend upon (1) the size of enrolment; (2) the number and nature of specialized courses; (3) the number and nature of elective and required courses.

The teacher-student ratio shall not be more than 1:15 in a school offering a Bachelor's course, and not more than 1:10 in other offering a Master's course. The maintenance of this ratio is necessary to permit supervisory and tutorial work of acceptable quality and individual research by the faculty members.

The selection of faculty shall rest upon academic qualifications and competency in professional subjects. The research publications and experience in professional field shall also be guiding factors in their selection. The teachers shall receive salary and hold rank comparable to their counterparts in other departments.

5 *Administration*

The head of the school shall be a full-time executive officer with both administrative and teaching responsibility. He shall hold the rank of a professor or reader depending upon the size and nature of the programmes. There shall be necessary administrative and clerical staff to assist the head and faculty members in carrying out their administrative duties.

The demand of library training at the beginning level (B.Lib.Sc.) is such that it may not be possible to secure competent persons to direct all the schools, for some time to come. In such situations alone a school offering Bachelor's course in Library Science shall be temporarily placed under the university librarian. But a full-time deputy head shall be appointed to assist the university librarian in discharge of his school duties. This, in no case, shall, however, apply to schools offering advanced programmes.

6 *Curriculum*

The curriculum at the Bachelor's level shall include the basic courses in librarianship, such as, Introduction to Librarianship (including history of books and libraries), Classification, Cataloguing, Bibliography, Book Selection, Reference Service, Library Organization and Administration, and Documentation. The number of such courses shall not exceed six, each consisting of 3-4 lessons of one hour duration in a week. There shall be a balanced curriculum without undue emphasis on certain areas.

The basic programme at this level of training shall place emphasis on fundamental principles and processes common to all types of libraries and all phases of library services and aim at promoting appreciation of books and libraries.

The Master's level shall serve as an intermediary stage for research and shall encourage use of seminars and discussion methods in its teaching.

Non-professional courses, such as General Knowledge, Current Affairs shall not form part of the curriculum at Bachelor's level. Specialization shall not be introduced at this stage but shall be taught at Master's level. (For school and college libraries, however, some courses shall be offered at this stage if the situation so demands).

7 *Requirements for Admission*

The school shall prescribe efficient selection procedures to ensure that applicants possess necessary interest in books and libraries. Admission to Bachelor's Course in Library Science shall be open to those possessing a Bachelor's degree in liberal arts, humanities, or sciences with at least a good second class.

Those applying for Master's course in Library Science shall possess at least a good second class in B.Lib.Sc. and one-year's experience of library work in a sizeable library.

Admission to the Bachelor's programme shall be subject to a test to judge the degree of interest of the candidates in books, and libraries.

High professional calibre and intellectual capacity shall be looked for in those applying for advanced courses. The number of students at this level shall be determined on the size of faculty and physical facilities necessary for advanced work.

8 *Physical Facilities*

Suitable and adequate quarters shall be available, for classrooms, practice work, colloquium, administration. There shall be enough classrooms to hold simultaneous classes based on the size of enrolment and number of courses being offered. Each full-time faculty member shall have separate office room.

The school quarters shall be separate of the university library but shall be at a distance from it reasonably convenient to the students.

9 *Equipment and Teaching Aids*

Facilities shall be available in the school for duplicating purposes. Audio-visual materials shall be available for use in classroom instruction.

If audio-visual aids are not available in the school, the school shall have access to such materials through regional or national centres.

10 *Library Resources*

Library science resources are as important for teaching of librarianship as are laboratories for sciences. The school, therefore, shall have access to an adequate and well-organized collection on library science to serve as a living example of organization and services to the prospective librarians. Although not complete historically, such a collection shall consist of important monographic publications, preferably in English, published since World War II.

It is not necessary, although preferable, to maintain a separate library of the library school. But it is important that such a collection shall have adequate space for shelving. It is also important that the area where that collection is housed shall have enough quarters to provide adequate individual carrels and reading tables to accommodate at least 25 per cent of library science students at one time.

A library science collection for a Bachelor's programme shall have a stock of at least 2,500 volumes. For Master's programme there shall be at least a basic collection of 5,000 volumes of monographs and bound serials issued since World War II. The periodical resources shall include important periodicals published throughout the world besides those published in the region. Those schools offering advanced programmes shall subscribe to 50 to 100 current periodicals and also maintain back files of carefully selected titles.

Ph.D. Programmes

Although the present study reveals that both India and Pakistan are ill-equipped at present for respectable Ph.D. programmes and that there is a general agreement among the experts that such a training would be more advantageous if it was pursued in a foreign country, yet there are three schools (Andhra, Delhi and Karachi) which have already enrolled students for such programme. Standards, proposed above, however, do not deal with Ph.D. programmes. It is, therefore, desirable to provide at least some guidelines for such programmes. To start with, a strong faculty possessing a sound research experience, should be available to guide the students. Part-time teachers should not have any place in such programmes, since they would not be able to give as much guidance as is required for Ph.D. programmes. Admission to these programmes should be open to high calibre students, possessing sufficient field experience, and capabilities of research. Those selected should be required to take a non-credit course in research methodology. And above all, there should be a well-rounded research collection consisting of between 5,000 and 10,000 volumes of monographic publications and serials. The periodical holdings of back files of important journals should be sufficiently strong and subscription to current periodicals should include all the titles, commonly listed in the Library Literature and Library and Information Science Abstracts with possible exceptions of American State Library Association journals.

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[32] The standards are in italics. The explanatory notes following it represent interpretation of the standards themselves.

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THE LIBRARY AS A TOOL FOR MEDICAL RESEARCH

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The author of an introductory history of anatomy echoed in his opening paragraph the thrill, the throb and the sense of elation and responsibilities of a medical student entering the dissecting room for the first time, in the following words: ".... for then he puts his hand to a task which other men dread, and joins the company of those who have laid aside the deepest fears and prejudices of mankind, to seek in the dead bodies of their fellows some increase of knowledge wherewith to fight the ignorance and disease that laid them low... the burden of his work will be lightened and his effort will be quickened by a sense of pride that he is one of that profession whose history is an endless record of hard-won progress from darkness toward the light. Whether we feel it thus keenly or not, however, the influence of the past inevitably guides our hands as we work, for not only in the ancient seats but in the newest schools of America, the methods we use, the names we learn, the present trends of our investigation have been determined by our predecessors; unless we understand them we can scarcely understand our own tasks." [1] . This rapport with the predecessors and the knowledge they bequeathed to us can surely be established best through recorded documents. The teacher and the librarian are vital links in this contact. Medical education and research, like all other branches of science, have changed considerably necessitating much wider use of books, monographs, periodicals, etc. than ever before. Indeed, the basic pattern of our civilization today is, perhaps, dependence on recorded communications. We can see this pattern in all our vocations at all levels. If we are asked, what then is the speciality of medical librarianship, we shall make only two observations. We believe, it has been accepted that 'medical librarianship is one of the professions ancillary to medicine, just like psychology, physiotherapy, and nursing, although it is more basic than any of these because it supports all departments of medicine and surgery.' We should say in the same breath that medical librarianship has a very clear objective before it. It urges the librarian to treat every request for information in a way as if he was part of the team engaged in the continued fight against suffering and contribute his mite to the development of the knowledge that eventually alleviates or cures. These, then, are the specialities of medical librarianship.

Medical Research

Like all other branches of scientific research, medical research too has considerably changed in its concept and character. It is said to be more and more mission-oriented rather than discipline-oriented. We are gradually comprehending the implications of this change in emphasis in terms of library support. Surely, the library support, both in terms of materials and service, required for a mission-oriented research programme like limiting the rate of growth of our population to a certain range within a specific period of time will be entirely different from that of acedemic research on birth control. Such a family planning programme would mean not only medical research on the most effective method of birth control but also research in the most suitable contraceptive, personal hygiene, social and family aspects, psychology, economics, publicity and managerial aspects. Hence, the library support or information needs for the proper sustenance of such a programme would not only be different in magnitude but different in nature. Planners of library and information services in advanced countries are showing an awareness of this approach by repeated emphasis on the 'network' concept in their national blue-prints.

Another aspect of research in general is that although research efforts have been increasing in terms of financial support, number of persons engaged, and in varied nature of problems tackled, library support, in many cases, have not increased proportionately. Commenting on this point, Dr. Ralph Shaw, a distinguished librarian and professor of library science, observed thus in an article in 1962:

"... Creative research is a mysterious product compounded of mechanical manipulations and creative intellectual processes. We commonly spend some $ 20, 000 to $ 50, 000 a year or more to provide physical support for each bench scientist, yet rarely do we allocate as much as 1 per cent of that amount each year to provide him with intellectual support." [2]. By intellectual support Dr. Shaw meant mainly library and information support. It may be noted also that Dr. Shaw's observations were made on the then prevailing conditions in the United States, a country where there is a keen awareness in library and bibliographical matters at all levels. More than anything else, we think, the best proof of this awareness is the release of a commission report under the chairmanship of Dr. Alwin Martin Weinberg entitled 'Science, government and information' in 1963 [3]. In fact, as one reviewer had put it, this report had brought the three words -- science, government and information in close juxtaposition for the first time. Hence, in spite of such an awareness and acceptance of the importance of information, if anybody can find the slightest fault in the information system of the U.S.A., it means the planning and provision of information services for the proper sustenance of research and education will have to be done on more sound and rational basis.

However, it is not our intention to present here an impressive library plan for medical research, rather we have only tried, so far, to draw your attention to the importance of library support to research in general and medical research in particular.

Bibliographical Tradition of Medical Science

Though we did not have the privilege to work in an exclusively medical library, yet, like all librarians and bibliographers, we have been attracted and much interested in the very rich bibliographical traditions of medical science. MEDLARS, today, is a most commonplace name to all users of medical literature. To a bibliographer and information scientist the name brings to mind the glorious and eventful past of medical bibliography and scholarship, though far less sophisticated, and MEDLARS stands out as the culminating point or a present day response to a long quest for effective bibliographical control of the growing literature of a broad subject.

Medicine drew the attention of bibliographers right from the begining of the sixteenth century, about fifty years only after the invention of printing. Symphorien Champier, a medical graduate of Lyons and an eminent physician, compiled the first truly medical bibliography. His bibliography, entitled 'De medicine claris scriptoribus', was printed at Lyons about 1506. This bibliography listed and introduced the medical writers and their writings in five sections: 1) ancient medical writers; (ii) philosophical writers on medicine; (iii) ecclesiastical writers on medicine; (iv) Italian medical authors; and (v) French, Spanish, German and English writers. The most important name of the century is Conrad Gesner, to whom is ascribed the title 'Father of Bibliography'. His Bibliotheca Universalis, (etc.) was published in three volumes at Zurich between 1545 and 1549. This was a general bibliography. It may be noted that apart from his proficiency in botany, natural sciences, the languages, Gesner was also a medical graduate and medicine was his chief interest. The sixteenth century attempts ended with the publication of 'Bibliotheca medica', (etc.) in 1950 by Pascal Lecoq, a native of Poitiers holding a medical degree. This bibliography made extensive use of Gesner's Bibliotheca and listed 1,224 medical authors writing in Latin.

Two notable names among the seventeenth century medical bibliographers are Johannes Antonides van der Linden (1609-64) and Cornelius a Benghem, both from Holland.

Linden studied philosophy and medicine at Leyden. His 'De scriptis medicis, (etc.)' was printed at Amsterdam in 1637 but this bibliography was kept alive through a number of editions and revision. Benghem was a magistrate and librarian at Emmerich in Westphalia. He published a number of bibliographies devoted to mathematics, law, politics, history and geography, and medicine. The medical bibliography entitled 'Bibliographica medica et physica novissima', was published at Amsterdam in 1681 and was largely an extension of Linden's work mentioned earlier.

All the above mentioned bibliographies and many more were the precursors of some of the best bibliographies of the eighteenth century. Albrecht von Haller is the greatest name of this century who has been acclaimed as the founder of medical and scientific bibliography and 'the greatest bibliographer in our ranks'. Haller, was born in Berne in 1708 and was an infant prodigy. It is said he complied a Greek lexicon at the age of ten. At the age of nineteen he qualified in the subject of medicine. It is said Haller applied for the professorship of history at the Berne University which was refused but was appointed librarian to the city. However, he became the professor of anatomy, surgery and botany at the Gottingen University after his brief sojourn as a librarian. Before we mention the titles of the bibliographies that Haller compiled, we are tempted to mention a figure as an index of erudition of this great man. Haller was responsible for about 13,000 scientific papers, besides his numerous books on anatomy, botany, physiology, surgery and historical fiction and poetry, within his not-too-long lifetime of 69 years. Assuming that he started writing at the age of nine: 13,000 papers mean writing 216 papers per year or more than 4 papers per week. His bibliographies are not merely lists but critical evaluations of what were listed. They are: Bibliotheca anatomica (2 vols, 1774-77), Bibliotheca botanica (2 vols, 1771-72); Bibliotheca chirurgica (2 vols, 1774-75), and Bibliotheca medicinae practicae (4 vols, 1776-88). All these volumes are large quartos of anything from 539 to 870 pages each.

Another important figure in the eighteenth century medical bibliography is Wilhelm Gottfried Ploucquet, a professor at the Tubingen University. His 'Initia bibliothecae medico-practicae et chirurgicae' was first published in eight volumes during 1793-97 but continued through supplements till 1813, with a total of seventeen volumes. One notable feature of this bibliography is that it lists the contents of periodicals also. Ploucquet described succintly a bibliographer's choler in the following words: "our life is too short and there are so many books; money is so scarce, and there is so little time".

The difficulties mentioned by Ploucquet accentuated manifold in the nineteenth century - there were many more books, many more articles in periodicals, but the scholars demanded quicker coverage of these materials in bibliographies. During this century we hear the names of a few notable British bibliographers. Robert Watt's work, Bibliotheca Britannica, (etc.) in four volumes published during 1819 to 1824, needs special mention. Watt gave up his medical career to work on his bibliography. He involved his two sons also in the work but, as ill luck would have it, Watt died in 1819 just as the printing of his bibliography started. It is said that this project completely ruined the Watt family both physically and financially. The publishers went bankrupt before paying the widow. As a climax to this tragic drama, the manuscript of the Bibliotheca was found later on among the possessions of Watt's youngest daughter who died insane in a work house. Thus one can read almost every word of Ploucquet's dictum in the short and tragic life of Watt - life is too short ... money is scarce, etc.

After this we do not want to rehearse more names, not only because they are numerous after this period but because latter nineteenth century and twentieth century bibliography has to be viewed from entirely different angles. The bibliographies of the earlier centuries remained focussed towards the past and they were the end products of individual research, scholarship and erudition. In contrast to them, the later bibliographies give more stress on the current literature and are designed to be the starting point of research and scholarship. The birth of current bibliography was closely linked to the constantly growing general need for research, the creation of learned societies and the rising number of journals. Another important characteristic of present day bibliography is that like research itself it is organised on the basis of team effort, so much so that at least in the U.S.A. it is considered to be an industry with all the economic implications for the manufacture of a commodity for the market. By saying this we do not want to belittle in any way the importance of modern bibliographies. We want to stress only that they are just different from what we had from the pioneer medical bibliographers mentioned earlier.

Perhaps, one of the typical examples of this shift in the concept of bibliography, especially medical bibliography, is the publication of the famous 'Index-Catalogue' in 1880 from Washington; incidentally it may be noted that the centre of activity had now shifted from Europe to the U.S.A. The name of John Shaw Billings of the Library of the Surgeon-General's Office (now renamed as the National Library of Medicine) is closely associated with both the important current, continuous, and comprehensive bibliographies that serve the medical profession. The first one was the 'Index-Catalogue of the Library of the Surgeon-General's Office' which continued publication from 1880 to 1961, thus providing, in all its five series, an unbroken record of the literature of 80 years. The second important bibliography is the 'Index Medicus' which began publication in 1878 and continues through several series and amalgamations through the vastly improved and enlarged Index Medicus of today.

Growth of Medical Periodical Literature

The periodical and the device of the scientific paper are two important innovations of the seventeenth century designed for quicker communication of research results than was possible through earlier vehicles like separately published exercitatio (essays) or the tractatas (treatise). With a modest beginning in the seventeenth century the number of journals increased so rapidly that today the problems of bibliographical control, library acquisition, location of documents, provision of reprographic facilities, etc. and the most serious problem, from the user's point of view, the fear of missing the most important paper of his interest, are all to a large extent directly linked with this tremendous growth. Historians of medicine and medical librarians alike have shown keen interest in the fascinating study of growth of periodicals. It has been observed that in the world of periodicals not only the birth-rate has been high but the mortality rate, especially infant mortality, has also been high with many cases of marriage (amalgamation), divorce (splitting) and even abortion (titles being announced but never published).

Beginning from 1679, only nine medical periodicals were started during the seventeenth century. The first periodical was the 'Nouvelles Decouvertes sur toutes les Parties de la Medecine', published from Paris in 1679; and the first English medical periodical was 'Medicina Curosa: or a variety of new communications in physick, chirurgery, and anatomy, (etc.), the first number of which was issued in 1684.

During the eighteenth century there was a sudden spurt in the number of new periodicals with a total tally of 436. Germany took a decisive lead with 246 titles (about 56% of the total) to its credit. But this growth in numbers should be studied in relation to mortality of titles. Such a study was made by Dr. Billings in 1876, showing the number of medical periodicals current at that time. This table with the corresponding figures for 1875, as supplied by Thornton [4] is reproduced in the next page.

From Table 1 it is clear that the death rate of periodicals has been so high, at least up to the third quarter of the nineteenth century, that in 1876 about 250 titles only could be counted as current although an estimated 1147 titles had commenced publication before that date. It may also be observed that Germany maintained the lead with United States as a close competitor.

We are reproducing in the next page another table from the same source, relating to the period 1945, which, when compared with the previous table, shows at a glance not only the quick rate of growth of periodicals in the present century but also the vastly changed countrywise distribution pattern of publishing of these journals. This table is based on the coverage of the Quarterly Cumulative Index-Medicus of 1945.

A comparison of the two tables brings out a few interesting points: (1) The rate of growth has been very high during this seventy-year period; (2) The first rank in publishing was taken by the United States by a very big lead; (3) As a result, nearly 47 per cent of medical literature was available in the English language, whereas in the previous period the

Table 1 - Showing the growth of medical periodicals, 1875-76

	Country	No. began	No. current on Jan. 1, 1875	No. current at beginning of 1876
1.	British America	19	6	7
2.	United States	214	53	46
3.	Mexico	6	1	8
4.	West Indies & South America	10	1	*
5.	Belgium	29	5	8
6.	France & Algeria	193	58	52(France only)
7.	Germany & Austria	386	47	57
8.	Great Britain	112	23	29
9.	Greece	2	-	*
10.	Holland	30	2	6
11.	Italy	65	41	31
12.	Japan	-	1	*
13.	Russia	12	2	*
14.	Spain & Portugal	31	6	6(Spain only)
15.	Sweden, Norway, Denmark	20	6	*
16.	Switzerland	16	1	*
17.	Syria	1	-	*
18.	Turkey	1	1	*
	TOTAL	1147	254	250

* Less than 6 titles

Table 2 - Showing the growth of medical periodicals, 1945

1.	United States	346
2.	South America	215
3.	Germany & Austria	111
4.	Great Britain	82
5.	France	62
6.	Italy	32
7.	Switzerland	20
8.	Spain	18
9.	India	18
10.	Scandinavia	17
11.	Canada	15
12.	Russia	15
13.	Belgium	11
14.	Others	28
	TOTAL	990

corresponding percentage was only about 30; (4) A few countries placed low in the previous table were eliminated while two new countries, Switzerland and India, made mark in the second table.

To compare these findings with more recent figures, we have analysed the list of journals indexed in the Index Medicus of 1968 with the following result:

Table 3 - Showing the growth of medical periodicals, 1968

Rank	Country	No. of titles
1.	United States	699
2.	Germany	230
3.	Britain	208
4.	Italy	182
5.	France	149
6.	Japan	134
7.	Switzerland	113
8.	U.S.S.R.	86
9.	Poland	51
10.	Netherlands	42
10.	Belgium	42
11.	Czechoslovakia	37
12.	Spain	31
13.	Sweden	30
13.	Canada	30
14.	India	29
15.	Denmark	27
16.	Rumania	18
17.	Australia	16
17.	Yugoslavia	16
18.	Mexico	15
19.	Hungary	14
19.	Austria	14
20.	Finland	10
21.	Others with less than 10 titles each	292
TOTAL		2515

Indian Medical Periodicals

It would be obvious that none of the above tables give a correct picture of medical journalism in India. In the first table, up to 1875, no Indian periodical is mentioned, although a few of them had already come into existence. As it happened in all other countries, Indian periodicals too had a very high death rate in the initial stage. Recently, an attempt was made by my young friend A. Neelameghan to piece together the history of medical periodicals in India from 1780 to 1920 [5]. In a foreword to this publication the late Dr. B.C. Roy observed, "The writer has broadly attempted to cover the very much forgotten and irregularly chronicled history of medicine in India in one particular aspect.... ". In his study Neelameghan is able to register the birth of about 86 periodicals during the period, of which most of the titles are extinct now. The Transactions of the Medical and Physical Society of Calcutta, which started publication in 1823 and continued till 1845 and seems to be the first professional medical periodical of India. Only three periodicals started during the previous century seems to have survived through the present century. They are 'Indian Medical Record', 1880-, 'Indian Medical Gazette', 1866-, both of them with changes in name and volumes, and a Gujarati journal 'Vaidya Kalpataru', Ahmedabad 1895-. In a recent article B.K. Sen and others [6] have given another list naming the

Indian medical periodicals started during 1920 to 1965. There are 401 titles in this list. The Directory of Indian Scientific Periodicals [7] was able to list 131 medical periodicals in 1964 and 202 titles in 1968.

Provision of Periodicals in Indian Libraries

We have dwelt a little more on only one type of material viz. periodicals as they are of particular significance to research workers and institutions not only because they are the vehicles to disseminate the results of research already done but also because they are the starting point of new research. Hence, one sure index of the research effectiveness of an institution is in the provision of periodicals in its library. This is not only with regard to the number of titles held but also in the selection of titles keeping in view the objectives of the institution. According to the 'World Medical Periodicals, 3rd edn., 1961, [8] there are 5,806 currently published periodicals of medical interest, out of which the Excerpta Medica, in all its sections, is covering 2728 titles (1964 figures) and the Index Medicus is covering about 2515 titles (1968 figures). If the Index Medicus figure is taken as a representative selection of world medicine in all aspects, then it may be worthwhile to check and see how far our medical libraries are provendered. Insdoc has recently published a union catalogue of serials in Delhi medical libraries [9]. The catalogue lists the holdings of 14 libraries and according to its preface they contain between them 3080 titles. Medical periodicals account for nearly 71% (2181 titles) of this total. On comparing this catalogue with the list of journals indexed in the Index Medicus we get the following results:

No. of titles covered in the Index Medicus	No. of medical titles in Delhi libraries	No. of titles covered in Index Medicus and held in Delhi libraries	Percentage coverage
2515	2181	975	38.76

Before we attempt to answer the question whether 39% coverage is adequate or not we should like to say something on two points: 1) What is the nature of the large number of titles (1206) which are held in Delhi libraries but are not indexed in the Index Medicus, and 2) what is the nature of those titles (1540) which are indexed in the Index Medicus but are not available in Delhi. On the first point we have to say that on analysis we find that this catagory mainly comprises of a large number of abstracting and indexing periodicals, reports of medical institutions, a number of Indian periodicals, proceedings of medical conferences etc. In the second category we find a large number of titles on related subjects like veterinary medicine, psychology, psychiatry, etc. and titles in less common foreign languages. But, at the same time, we find important omissions like, British Journal of Medical Education, Cardiovascular Research (London), Current Practice in Orthopaedic Surgery (St. Louis), Current Problems in Surgery, Journal of the Japanese Orthopaedic Association, etc. to mention only a few.

Regarding the main question as to whether a 38% coverage of the Index Medicus coverage is good enough for research support, it is difficult to give a categorical answer, as conditions would vary from place to place. Just to give an indication we may mention a report from Canada where this point is considered with regard to Canadian conditions[10]. It was felt that 50% could be regarded as good coverage. It has to be remembered that a higher coverage may not directly contribute to better research support, because with the inclusion of more titles in less-known languages better translation facilities will have to be provided.

Literature on Orthopaedic Surgery

Analysing the literature of a more specific subject, which is of your immediate interest, we think, we sould be able to throw some more light on the above points. Analysing again the Cumulated Index Medicus of 1967 volume, under 9 headings - Orthopaedics, Amputation, Arthrodesis, Arthroplasty, Fracture Fixation, Leg Lengthening, Manipulation (Orthopedic), Osteotomy, Spinal Fusion, and Traction, we could obtain the following figures:

1.	No. of papers reported	720
2.	No. of journals reporting the papers	199
3.	No. of journals held in Delhi libraries (out of 199)	86 (43%)
4.	No. of papers which could be obtained in Delhi libraries (out of 720)	308
5.	Percentage of item 4 (out of 720)	43%
6.	Percentage of English papers (out of 720)	34%

One inevitable conclusion would be that literature on orthopaedics is not very well represented in Delhi medical libraries. It may also be said that Indian orthopaedic literature is not well represented in the Index Medicus. Two important journals - Indian Journal of Orthopaedics (1967 -) and Indian Journal of Surgery, are not indexed in the Index Medicus.

It is for you to decide whether 43% coverage (including non-English) of world literature on orthopaedic surgery is adequate or not for your research work, but it is interesting to find that the literature on this subject is contained in a number of non-English periodicals and the most productive of them are not available in Delhi. The following table shows the first ten rankings of periodicals, according to the number of articles reported, and their availability in Delhi.

Table 4 - Showing the first ten ranking of periodicals reporting orthopaedics literature

Title of periodicals	No. of articles	Availability in Delhi	Cumulative total	Cumulative percentage
1. Crtopediia, Travmatologica, i Protezirovanie (Russian)	31	No	31	4.3
2. Hefte zur Unfallheilkunde, beihefte zur Monatsschrift... (German)	29	No	60	8.3
3. Journal of Bone & Joint Surgery - American vol. (English)	23	Yes	83	11.5
4. Chirurgia Narzadow Ruchu i Ortopedia Polska (Polish)	21	No	104	14.5
5. Monatsschrift fur Unfallheilkunde, versicherungs-, versorgungs-, und verkehrsmedizin (German)	19	No	123	17.1
6. Orthopedic Surgery (Japanese)	18	No	141	19.6
7. Journal of Bone and Joint Surgery - British Vol. (English)	17	Yes	158	21.9
8. Acta Orthopaedica Belgica (French)	16	No	174	24.1
9. Beitraege zur Orthopaedie und Traumatologie (German)	15	No	189	26.2
10. Revue de chirurgie Orthopedique et Reparatrice de l' Appareil Moteur (French)	15	No	204	28.3

Library Service to Medical Research Workers and their Information Needs

Our intention in saying a few things about medical bibliography and medical literature, in the foregoing paragraphs, is to make the point that medical librarianship is not merely the maintenance and administration of a collection of books, journals, reports, etc. Throughout my career as a librarian I have very often asked many of my young librarian friends not to mortgage their intellect to the card catalogue or the technique of classification but to use it more and more to know more intimately the literature of the subjects under their care, on the one hand, and the users and their needs on the other. This has become necessary more than ever due to a tremendous growth in literature making it impossible for any single library to be self-contained, and also due to the changed character of information requirements of research workers. Each library unit shall have to be viewed as an exploitation point in a vast network of a library system and the bibliographical organisation of the literature of any subject will have to be clearly understood and taken help of. Provision of bibliographies, compilation and maintenance of union catalogues, increasing inter-library loan facilities, provision of reprographic and translation facilities, etc., are all very necessary concomitants to the concept of library network.

A number of studies have been made to plot the information flow from the moment it is generated upto its use by the customers. These surveys have helped us much to realign or readjust some of our conventional bibliographical tools, like abstracting and indexing periodicals, and in some cases design completely new bibliographical tools, to meet different approaches to information. Proof of this change can be seen in the recent adjustments of most of our major abstracting and indexing periodicals, including the Index Medicus with its new subject headings (MeSH) and speedier production, and in the publication of new tools like current awareness services and new types of indexes like KWIC, KWOC, etc. An abstracting or indexing periodical is now more adapted to meet the 'exhaustive approach' i. e. to furnish, on demand, the reports on all the work done on a given subject over a specified period of time. Similarly there are a few quick announcement services to meet the 'current awareness' approach, i. e., to keep the scientist abreast of developments in his chosen area of interest. The Index Medicus aims to satisfy both these approaches. However, we find that at least two Delhi medical libraries are getting the 'Current Contents', a tool specifically designed to meet the current awareness approach. We would like to know very much as to how far this service is used and to what effect. The numerous subject reviews being published in serial form like the advances, progress, year's work, etc. are designed to meet yet another approach to information, viz. 'brush up' approach, i. e., to enable a scientist to familiarize himself with the recent developments in an area which had not been his specific area of interest. In such publications the literature of a subject is very skillfully sifted, evaluated and the significant contributions put into proper perspective. The last category of approach to information, which we have recognised, is the 'everyday approach' i. e., to furnish, on demand, the most up-to-date answer to specific questions, may be just hard nuggets of data.

We believe most of you will recognise that you use the library to satisfy any one of the four categories of information needs, enumerated above, or a combination of them at any time. Your approach, naturally, is to the entire information system in which your library is just an exploitation point or a service centre. It is the duty of the librarian to find out how best he can collect and serve the correct information at the service point. It may seem that we are only saying the obvious, but we have a feeling that even this obvious is at times lost sight of either through the ignorance of the librarian about the information needs of his clientele or through the ignorance of the users about the potentialities of the library. Our fears have been corroborated in a number of recent survey reports and the pronouncements of a number of commission reports, like the Weinberg report and the report of the Advisory Council on Scientific Policy of Britain. The British report had to observe this: "In general, libraries appear to be playing little more than a passive role in the research process; they are regarded as stores rather than as sources of information and this situation is bad both for the scientist and the librarian" [11]. This is exactly what we would not like to happen in our country.

Professional Responsibilities

The opportunity that you have given us today to meet and address a highly specialised community of scientists, like you, encourages us to refer again, for the third time, to the message of the Weinberg report. As you are aware, the report was mainly addressed to the scientists, both as individuals and also as a community. The central theme of the report was, "... the information process is an integral part of research and development. ... communication involves in an intimate way all segments of the technical community, not only the documentalists. The attitudes and practices toward information of all those connected with research and development must become indistinguishable from their attitudes and practices toward research and development itself." In other words, "... the technical community must devote a larger share than heretofore of its time and resources to the discriminating management of the ever-increasing technical record. Doing less will lead to fragmented and ineffective science and technology."

Very earnestly, we hope that the dialogue between the medical profession and the library profession, that we have the privilege to start today, will continue and guide us in the discriminating management of the ever-increasing medical record for the most effective and healthy development of medical research in our country. One way to continue this dialogue may be to undertake some sort of a survey regarding the information needs and requirements of medical workers in India in general or surgeons, dentists, specialists in cerebro-vascular diseases, chest diseases, etc.

Medical librarianship is surely incomplete without a reference to MEDLARS, which we have not referred to so far deliberately as we wish to consider the implications of it in the context of cooperation between the medical and the library professions. As you know the MEDLARS is a complete medical information system - a combination of information storage, retrieval, and publications programmes. In India we are familiar with only one aspect of the system through the printed volumes of the Index Medicus. As by-products of this a number of recurring bibliographies are also being produced in the field of dentistry, nursing, cerebro-vascular disease, arthritis, etc. The other aspect is that from the magnetic tapes demand bibliographies on very specific topics can be produced very quickly in readable form. This service could be availed of at the National Library of Medicine only for some time but with the initiation of a programme of decentralization MEDLARS search centres have now been established at a number of places, like the University of Colorado, University of California, etc., with the distribution of MEDLARS tapes to these places. In fact MEDLARS has now crossed the Atlantic and has come to England, Sweden and Japan. Countries like Canada, Germany and a few others are actively considering the possibilities of creating at least one national centre with computer facilities, in each country, to receive MEDLARS tapes. In fact this possibility is going to have very profound implications on medical librarianship in the near future. Can we also think along these lines? We may tell you that the availability of tapes is going to be different from the possession of Index Medicus volumes in some ways. The MEDLARS tapes had accumulated more than 500,000 references, till 1966, with more than three million indexing terms. In other words the depth of indexing is much more in the tapes than the Index Medicus, hence compilation of bibliographies on very specific subjects is easier. Secondly, we have to think of the ways and means of extending the facilities of this tape, received at the national centre, to the largest number of potential users. We have to think whether some sort of group SDI of even personal SDI service, apart from demand bibliographies, could be provided from this national centre. So far as cost factor is concerned very little is known at the moment. It is reported that the National Library of Medicine is spending more than one million dollars annually on the project and they would like to share this expenditure with more and more national MEDLARS centres. It is also reported that a comprehensive search of one year's medical literature citations cost only 60 dollars in decentralised MEDLARS centre in the U.S.A. [12]. Finally, we may say that the availability of MEDLARS tapes is not going to do away with our medical libraries nor librarians. Let there be no misconception on this point. In fact for the best utilization of these tapes our libraries will have to be organised better, provendered on a larger scale, and serviced on more efficient lines, with better reprographic and translation facilities. Let us also remember that to receive MED-

LARS tapes is to establish a direct link with the richest bibliographical centre of bio-medical literature the like of which it would be impossible for any country to create.

If a little digression is permitted at this point, we would like to make a general observation on the present day system of bibliographical control in general and the perspective of the MEDLARS system in particular. As a result of the tremendous increase in the size of the research community, with more number of published documents carrying reports of research findings, with a number of workers with highly specialised curiosities scattered in many countries, it is becoming increasingly difficult to maintain a direct link between the creator and the ultimate user of a document. The sheer bulk of the newly created documents coupled with a demand for their prompt bibliographical harnessing has made it impossible to pause and devote the same care, analysis of thought contents, classification, indexing finesse, and featuring, that was obvious in earlier bibliographical work. The present trend is to control the avalanche of literature in such a way and in such a form, even at the cost of some indexing or other bibliographical finesse, that they can be quickly brought to the notice of its potential users. The newer forms of computer produced indexes are direct outcome of this. It is often argued that all that is being published may not ultimately have the same usefulness. Their is no dispute on this point, but the fact remains that in our present state of highly intensified research with every concievable topic under attention, nobody can take the risk of prior selection. Faced with this plethora of literature the users of information have also reacted in different ways at different times. Their demands on the science information system have been at times apparently contradictory. Thus some workers want that everything that is produced must be listed and shown to them, whereas a few others demand that only those items which are of direct interest to them should be brought to their notice. Thus, as direct consequence of growth in volume of literature and also nature of demand, proper bibliographical control has come to mean recording of information in newer media which will give the maximum facility of manipulation and ease of approach. Thus instead of our age-old conventional printed lists we are trying to record the information in the form of magnetic tapes and magnetic disks, which can be duplicated and easily manipulated to give out, as print-outs, the required bibliographical information. MEDLARS is the symbol of this new trend.

All these have the implications, so far as the users are concerned, that proper use of the new media like magnetic tapes or disks not only require the use of machines but also a knowledge of machine indexing, specially the limitations, filing rules, etc. Just at the moment nobody can say whether this new direction that bibliographical control has taken, which has come rather as a response to meet a house-on-fire situation, is the right direction. Perhaps our experience during the next decade or so will only show whether we are treading along right lines but we cannot afford to fall far behind in the meantime.

The library profession in India would very much like to know the views of the medical profession on the above points - the feasibility of having the MEDLARS tapes and their possible uses, in particular, and the sharing of some responsibilities in the medical information work, in general, in the true spirit of the Weinberg Report. We need hardly say to you that in any sphere of international cooperation, a strong and organised national view is a prerequisite for fruitful participation. The declaration of the Library of the Directorate General of Health Services as the National Medical Library has been a right step in this direction. Our appeal now, to the medical and the library professions, is to come closer and forge a strong organised national view on all matters of library and information services for the most healthy sustenance of medical research.

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SCATTER OF INDIAN GEOLOGICAL DOCUMENTS IN INDIAN AND FOREIGN PERIODICALS

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The scatter of Indian geological documents in Indian and foreign periodicals has been studied. The survey indicates that more than 90% of the documents have been covered in Indian sources. It also focusses the various degrees of interest shown by the foreign periodicals on Indian geology.

Growth of Indian Geological Documents

Importance of geology was felt even in ancient India. Kautilya (321-296 B.C.) admitted that (Mines are the sources of treasury). Modern development of geology in India started after the establishment of Asiatic Society of Bengal in the year 1784 and later with the establishment of Geological Survey of India in the year 1851. With the advancement of time, study and research in geology increased gradually. A number of research bodies were established for this purpose. At present the following Institutions and Societies in India are engaged in research on geology and allied science:

1. Geological Survey of India, Calcutta.
2. Indian Bureau of Mines, Nagpur.
3. Oil & Natural Gas Commission, Dehra Dun.
4. National Coal Development Corporation, Ranchi.
5. National Geophysical Research Institute, Hyderabad.
6. Central Mining Research Station, Dhanbad.
7. Central Fuel Research Institute, Dhanbad.
8. Central Salt and Marine Chemicals Research Institute, Bhavnagar.
9. State Directorates of Geology (in almost each state)
10. Birbal Sahani Institute of Palaeobotany, Lucknow.
11. Mining Geological Metallurgical Institute of India, Calcutta.
12. Geological Mining and Metallurgical Society of India, Calcutta.
13. Geological Society of India, Bangalore.
14. Geochemical Society of India, Patna.
15. Soil Conservation Society of India, Hazaribagh.
16. Indian Mine Managers' Association, Dhanbad.
17. Mineralogical Society of India, Madras.
18. Indian Geoscience Association, Hyderabad.
19. Indian Society of Soil Science, New Delhi.
20. Indian Association of Geohydrologists, Calcutta.

The total output of Indian geological literature by the cummulated efforts of all these organizations and societies is quite substantial. The study of the distribution of all these documents in Indian and foreign periodicals is interesting for many reasons.

Purpose

Purpose of this survey is to find out the present tendency of the Indian geologists to publish their papers in Indian/foreign journals. It also reveals the amount of interest shown by foreign geologists in Indian geological problems.

Scope

Literature published in the field of Indian geology and allied sciences during the year 1967 has been considered for this study.

Methodology

Library Bulletin, Geological Survey of India, Sec B, was selected for this project. It is a fortnightly mimeographed publication, containing indexes to Indian and foreign geological literature in two separate sequences. Bibliography and Index of Geology Exclusive of North America, an international bibliographical service on geological sciences, published by the Geological Society of America was not considered for this study as the coverage of the Library Bulletin, Geological Survey of India, Sec B is more so far as Indian geological documents are concerned. Besides containing signed articles the Bulletin also incorporates anonymous article and information of geological interest. Only signed articles were selected for this study. Documents of distant penumbral region were also excluded. Documents published in Indian and foreign periodicals were considered separately and the data is represented in Table I and II.

Annotations

1. 918 signed documents on geology and allied sciences were covered by the Library Bulletin Geological Survey of India, Sec B, 1967.

2. Out of the total 918 documents, 870 i. e. 94.8% of the total were published in 71 Indian periodicals and 48 documents, 5.2% of the total documents covered, were published in 28 foreign periodicals.

3. Of the total documents covered, 872 were contributed by Indian geologists, 42 by foreign geologists and 4 documents were contributed jointly by Indian and foreign geologists.

4. The total documents were scattered in 99 host periodicals and other publications published from the following countries:

India	71
U. S. A.	10
U. K.	5
Germany	2
Holland	3
Sweden	2
U. S. S. R.	1
Japan	1
France	1
Norway	1
Switzerland	1
Austria	1
Total	99

5. The documents were scattered in the following language break down of host sources.

English	86
Hindi	3
English-German	3
German	1
French	1
English-Swedish	1
English-Japanese	1
English-Norwegian	1
English-Dutch	1
English-French-German	1
Total	99

6. 42 foreign geologists have contributed on some aspects of Indian Geology during the year under review. It reflects the interest shown by the foreigners in the development of Indian geology and cooperation in solving the problems.

7. The study also indicates that the periodicals of U. S. A. have taken more interest in Indian geology than those of any other foreign country.

8. This tendency of publication may be noted for bibliographical control and earth science planning in India.

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Geological Survey of India Library Bulletin, 1967

Indian Periodicals

	Title of the Periodical	Years of papers reported					Author		
		1964 and earlier	1965	1966	1967	Total	Indian	Foreign	Joint
1	2	3	4	5	6	7	8	9	10
1.	Bhagirath, New Delhi				3	3	3		
2.	Bijnan Parishad Anusandhan Patrika (Hindi), Allahabad			1		1	1		
3.	Bulletin Central Glass Ceramic Research Institute, Calcutta				3	3	3		
4.	Bulletin Central Research Institute, University of Kerala, Series C, Trivandrum	1				1	1		
5.	Bulletin Department of Industries, Himachal Pradesh, Simla				1	1	1		
6.	Bulletin Geochemical Society of India, Patna			4		4	4		
7.	Bulletin Geological Society of India, Bangalore		27	72		99	95	4	
8.	Bulletin Geological Survey of India, Series B, Calcutta				2	2	2		
9.	Bulletin National Geophysical Research Institute, Hyderabad			2	3	5	5		
10.	Bulletin Oil & Natural Gas Commission, Dehra Dun			6		6	6		
11.	Coal Reporter & Mineral News, Calcutta			1	2	3	1	1	1
12.	Commerce, Bombay			3		3	3		
13.	Current Science, Bangalore			7	29	36	36		
14.	D.N. Wadia Commemoration, Volume, Mining Geological & Metallurgical Institute of India, Calcutta		16			16	16		
15.	Defence Science Journal, New Delhi		2			2	2		
16.	Eastern Metals Review, Calcutta			1		1	1		
17.	Explorer, Bhubaneswar				5	5	5		
18.	Everyman's Science, Calcutta				1	1	1		
19.	FRI News, Dhanbad			2		2	2		
20.	Himalayan Journal, Calcutta			13		13	5	8	

1	2	3	4	5	6	7	8	9	10
21.	ISI Bulletin, New Delhi				2	2	2		
22.	Indian and Eastern Engineer, Bombay				1	1	1		
23.	Indian Journal of Meteorology & Geophysics, New Delhi			2		2	2		
24.	Indian Journal of Mining Geology Metallurgy & Fuel, Raniganj			1	3	4	4		
25.	Indian Journal of Power and River Valley Development, Calcutta			1	5	6	6		
26.	Indian Minerals, Calcutta			7		7	7		
27.	Indian Mineralogist, Bangalore			17		17	17		
28.	Indian Mining and Engineering Journal, Bombay			10	5	15	14	1	
29.	Indian Museum Bulletin, Calcutta			1		1	1		
30.	Indian Potter, Calcutta				2	2	1	1	
31.	Indian Refractory Makers Association Journal, Calcutta			3		3	3		
32.	Industrial Times, Bombay				1	1	1		
33.	Journal of the Assam Science Society, Gauhati	1				1	1		
34.	Journal of the Asiatic Society, Bombay	1				1	1		
35.	Journal of the Geochemical Society India, Patna			9		9	9		
36.	Journal of the Indian Society of Soil Science, New Delhi			6	5	11	11		
37.	Journal of the Institution of Engineers, Calcutta				1	1	1		
38.	Journal Institution of Military Engineers, Poona				1	1	1		
39.	Journal of Mines Metals and Fuels, Calcutta		1	18	26	45	44	1	
40.	Journal of the River Research Institute, Calcutta			7		7	7		
41.	Journal of Soil and Water Conservation in India, Hazaribagh			8		8	8		
42.	Metals and Minerals Review, Calcutta			1		1	1		
43.	Mines & Minerals, Nagpur	4				4	4		
44.	Minerals and Industries, Calcutta		4			4	4		

1	2	3	4	5	6	7	8	9	10
45.	Mineral Wealth, Ahmedabad			8	4	12	12		
46.	NML Technical Journal, Jamshedpur			2		2	2		
47.	News Letter International Indian Ocean Expedition, New Delhi				35	35	30	3	2
48.	News Sketch, Dhanbad				9	9	9		
49.	ONGC Reporter, Dehra Dun				1	1	1		
50.	Oil and Coal News, New Delhi			1		1	1		
51.	Oil Commentary, Dehra Dun			2	1	3	1	2	
52.	Palaeobotanist, Lucknow				35	37	22	15	
53.	Palaeontologia Indica, Calcutta	1				1	1		
54.	Proceedings Indian Academy of Science Section B, Bangalore				2	2	2		
55.	Proceedings Indian Science Congress, Association, Calcutta	144		42	138	324	323	1	
56.	Proceedings National Institute of Sciences India, New Delhi			2		2	2		
57.	Publication Centre of Advanced Study on Geology, Chandigarh			3		3	3		
58.	Quarterly Journal Geological Mining and Metallurgical Society of India, Calcutta		8			8	8		
59.	Records of the Geological Survey of India, Calcutta			11		11	11		
60.	Research Bulletin Punjab University, Chandigarh			2		2	2		
61.	Research and Industry, New Delhi			1	1	2	2		
62.	Research Paper, Central Mining Research Station, Dhanbad	4	5			9	9		
63.	Science and Culture, Calcutta			4	7	11	10	1	
64.	Science and Engineering, Calcutta			2		2	2		
65.	Science Reporter, New Delhi			2	3	5	5		
66.	Steel & Mineral Review, Calcutta			5		5	5		
67.	TISCO, Jamshedpur				1	1	1		

1	2	3	4	5	6	7	8	9	10
68.	Transactions of the Indian Ceramic Society, Calcutta			4	4	8	8		
69.	Transactions of the Mining Geological and Metallurgical Institute of India, Calcutta	4	6			10	10		
70.	Vignan Pragati (Hindi), New Delhi				1	1	1		
71.	Yojana (Hindi), New Delhi				2	2	2		
	TOTAL	158	71	296	345	870	829	38	3

Geological Survey of India, Library Bulletin,

Foreign Periodicals

Sl. No.	Title of the Periodical	Years of paper reported				Author		
		1965	1966	1967	Total	Indian	Foreign	Joint
1	2	3	4	5	6	7	8	9
1.	Acta Universitatis Upasaliensis, Uppsala			1	1	1		
2.	Analytical Chemistry, Washington		1		1	1		
3.	Bulletin of the Seismological Society of America, California			1	1	1		
4.	Doklady of Academy of Sciences, USSR (English translation): Series geology, Washington			1	1		1	
5.	Economic Geology, Pensylvania		1	2	3	3		
6.	Geological Magazine, Hertford		1		1	1		
7.	Geologie en Mijnbouw, Hague		1		1	1		
8.	Geologische Rundschau, Stuttgart		1		1	1		
9.	Geophysics, Tulsa		1		1	1		
10.	Geophysical Journal, Oxford			1	1	1		
11.	Geophysical Prospecting, Hague		1	1	2	2		
12.	Jahrbuch der geologischen Bundesanstalt, Viena		1		1		1	
13.	Journal of Geology, Illinois		1		1	1		

1	2	3	4	5	6	7	8	9
14.	Journal of Geophysical Research, Washington			1	1		1	
15.	Journal of Palaeontology, Tulsa		1		1		1	
16.	Journal of Sedimentary Petrology, Tulsa		1	2	3	3		
17.	Liaison Report Commonwealth Geological Liaison Office, London			1	1	1		
18.	Marine Geology, Amsterdam			1	1	1		
19.	Memoirs of the Faculty of Science Kyushu University Sr D - Fukuoka			1	1			1
20.	Micropalaeontology, New York		1	2	3	3		
21.	Mineralogical Magazine, London		6		6	6		
22.	Norsk Geologisk Tidsskrift, Oslo			2	2	2		
23.	Palaeontographica, Stuttgart			1	1	1		
24.	Philosophical Transaction of the Royal Society, Sr. B. London	1			1	1		
25.	Pure and Applied Geophysics, Basel		8		8	8		
26.	Revue de Micropaleontologie, Paris			1	1	1		
27.	Tellus, Stockholm			1	1	1		
28.	Zeitschrift fur Geomorphologie, Berlin (W).			1	1	1		
	TOTAL	1	26	21	48	43	4	1

ANATOMY OF A DOCUMENTATION SERVICE

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Enumerates the technical processes involved in the selection, evaluation, and indexing of incoming scientific literature for building up a pool of information oriented to the specific needs for compilation of an encyclopaedia on raw materials and industrial products of India, and their subsequent retrieval for selective dissemination to the personnel concerned with the project.

Introduction

The encyclopaedic compilation "Wealth of India" is a compilation on economic products of India, based on the "Dictionary of Economic Products of India" by George Watt and published in 1889-93. It is intended to serve as a reference guide to people with varied interests.

Consisting of two series, "Raw Materials" and "Industrial Products", the former deals with raw materials of vegetable, animal and mineral origin, while the latter is concerned with the present position and development of industries - chemical and engineering industries, and industries based on indigenous crafts in India.

A documentation service, oriented to the needs of information for compilation of papers for this encyclopaedia, exists here since 1947. It aims at maintaining a central reservoir of information consisting of literature files and catalogue of bibliographic references. This catalogue is compiled after careful scrutiny and indexing of relevant scientific literature contained in numerous journals, reports, bulletins etc.

Its secondary function is to provide the editorial staff with an up-to-date and comprehensive information in the form of subject bibliographies about topics on which they are compiling papers for the encyclopaedia till their final drafts are complete. This forms the essence of SDI (Selective Dissemination of Information) service rendered by the Documentation section here.

SDI Service

The cataloguing of bibliographical references of useful information pertaining to the encyclopaedia is a prelude to successive technical operations leading to the compilation of subject bibliographies.

To many, the SDI service seems to be associated with the rapid processing of information through electronic digital computers; but whatever may be the means of operation-- computerised processes or the manual methods --the end purpose is the same in both cases i. e., to supply selected information to the client-- as if "on a platter"-- at regular intervals.

Depending upon the exigencies peculiar to a particular project, the system or the operational process may not follow a beaten track. The underlying principle of information storage and retrieval remaining the same, the operational system may consist of technical processes not necessarily conforming to the conventional ones. Uniterm indexing system which forms the basis of manual and mechanised means of information retrieval in a conventional SDI service, has not been adopted here due to needs peculiar to the project under discussion.

Indexing System

Primary and secondary periodicals, patents, standards, technical bulletins, research reports, proceedings and conference papers etc. are regularly scrutinized by subject specialists and analytical entries are made for useful information with appropriate subject headings. Bibliographical entries for articles are made under one or more subject headings in conformity with the list provided. Thus this process differs in principle from the computerised SDI service wherein the indexing and retrieval of information is based on keywords occurring in titles of articles. When a title is not sufficiently meaningful or does not contain adequate number of appropriate keywords, the retrieval will bring in "noise" or irrelevant information. The problem of "noise" is still more accentuated in KWIC (Keyword in context) indexing wherein the title is mechanically recirculated by bringing each of the terms to the forefront and eliminating those (mostly prepositions, conjunctions etc.) which are not considered meaningful. In such cases the titles of papers have to be editorially supplemented, when necessary, with additional keywords to provide multiple search terms for each paper. Thus each key term, whether in the title originally or added through editing, becomes a search term listed in the alphabetical arrangement.

In the present system, keywords for use in subject headings are selected from titles only when they help to identify the subject dealt in the article, otherwise they are selected from abstracts, or the text, or supplemented by additional keywords. These keywords are selected from an authority list of subject headings or thesaurus which will be discussed in the next paragraphs. A few examples may clarify the point.

1. Mookherjee, P.B. Jotwani, M.G. Yadav, T.D. and Sircar, P. Disinfestation of stored seeds by heat treatment. Indian J Ent 1968, 30(3): 197-202.

The text of the article contains the following common names which concur with those in the list of subject headings:-

Wheat, Maize, Jowar, Mung, Pea and Gram.

Since the raw materials of vegetable origin are entered under their corresponding botanical names, six analytical entries are made under the following subject headings:-

Triticum, Zea mays, Sorghum vulgare, Phaseolus aureus, Pisum sativum, and Cyamposis tetragonoloba

2. Manske R.H.F. Alkaloids of fumariaceous plants. LVII. Miscellaneous observation. Canad J Chem 1969, 47: 1103-1105

The paper reports the isolation of a number of new alkaloids for the following plant species:-

Fumaria officinalis L.
Corydalis ochroleuca Koch.
Corydalis tubrosa De.
Corydalis pallida (Thunls.) Pers
Corydalis sibirica (L.) Pers.

Since the information is indexed on only Indian plants or exotic plant species naturalised in India, only two analytical entries were made with the following terms as subject headings:-

Fumaria officinalis Linn.
Corydalis sibirica (L.) Pers.

3. Waller, G.R. & Hans Burstroin. Diterpenoid alkaloids as plant growth-inhibitors. Nature, 1969, 222(5193): 576-78

The article reports studies on the plant growth inhibitory activity of two diterpenoid alkaloids isolated from the common larkspur Delphinium ajacis, only one index entry is prepared with the following subject heading:-

Delphinium ajacis Linn.

For animals and minerals, their common names -- and not scientific names -- are listed in the thesaurus because the people in general are more familiar with the former, e.g.

4. Venkataram, R. & Chari, S.T. Food value of the edible portion of the Indian Chank, Xancus pyrum. Curr Sci, 1953, 22: 22-23

Index entry is made under the common name 'Molluscs' as its subject heading.

5. Joseph, G. & Prasad, B.G. Epidemiological study of filariasis in the coastal belt of Kerala state. Indian J med Res 1967, 55(11): 1959-72

In this case, 'parasitic worms' is the subject heading.

The citation of bibliographic references in index entries follows the pattern of title abbreviations as in the 'World List of Scientific Periodicals'.

Role of Thesaurus

In the foregoing passage, it has been noted that subject headings are taken out of an approved list. This list is, in fact, a thesaurus containing a list of terms - botanical names for materials of vegetable origin, and common names of those of animal and mineral original, all arranged alphabetically. While selecting terms or supplementing them, the indexer is guided by this list. This thesaurus, which is kept up-to-date with additions of new terms and elimination of superseded ones, may be said to constitute the User Profile, while the array of index entries forms the Subject Profile of the SDI service.

In case of raw materials, the thesaurus contains an alphabeticall array of botanical names-- first under genus, and then under species.

A list of subject headings for industrial products is also included in the thesaurus.

Why not Uniterm Indexing

As the articles selected for indexing deal with a limited range of disciplines, a number of keywords will be common as subject headings to many index entries, e.g.,

(1) Karkal, M. & Navalkar, B.S. Studies in the phosphorus fractionation in some edible plant leaves, grown in Bombay and its subarbs. Pt.II. Trigonella corniculata Linn. J Univ Bombay (N.S.), 1961-62, 30B(Pt 3&5): 7-14

(2) Atal, K.C. & Sood, S.P. Phytochemical investigation on the seeds of Trigonella corniculata Linn. Indian J Pharm 1964, 26(3): 81

(3) Atal, C.K. & Sood, S.P. Phytochemical investigations of Trigonella corniculata Linn. J Pharm Lond 1964, 16(9): 627-29.

The botanical term Trigonella corniculata Linn. is common to several index entries here and such cases are many. A critic may very well ask why Uniterm indexing has not been followed here as it would have effected economy of material and labour. The answer is that the filing system of index entries, being oriented to the needs peculiar to this project, is so different from the conventional one that Uniterm Indexing cannot be adopted here.

As the gradual development of scientific studies on a subject has to be traced from its initial stages, catalogue cards bearing index entries are arranged in a chronologico-alphabetical sequence. This is different from a purely alphabetical arrangement which is a prerequisite to Uniterm Indexing system. The index entries bearing botanical subject matters are first arranged alphabetically under genus, and then under their respective species. In case of an economically important plant with a large number of bibliographical references, the entries are further classified according to its cultivation, disease, utilisation, statistics, trade etc., and then arranged according to corresponding subheadings. An example is given below:-

Tamarindus Linn. (Leguminosae)

T. Indica Linn.

- General
- Botany
- Cultivation
- Diseases and Pests
- Utilization
    - Timber
    - Feeds and Fooder
    - Textiles
    - Medicinal
    - Tannins, Dyes, Gums, Resins, Pectin
    - Miscellaneous
- Chemistry

The arrangement of index entries on such plants follows the same pattern of layout of topics in the encyclopaedia. Their final arrangement is according to their years of publication followed by an intrinsic alphabetical arrangement of genus, species and subheadings. An extract from a subject bibliography is given below:-

Trigonella foenum - graceum Linn.

Diseases and Pests

Rahman, K.A. & Sapra, A.N. On the biology of the vegetable mite (Tetranychus cucurbitae Rahman and Sapra : Fam. Tetramychidae). Indian J agric Sci 1945, 15: 124-30

List of common names of Indian plant diseases. Indian J agric Sci 20(Pt 1):140-41, 1950

Joshi, N.C. Second contribution to the study of fungi from Ajmer. (Rajasthan). Agra Univ J Res (Sci), 1957, 6(Pt 2): 15-17

Khan, S.A. Powedery mildews of Tandojam. Pakist J Sci Res 1958, 10(2):82

Gupta, K.G. & Sen, A. Variations in the characteristics of Rhizobium Spp. of gram (Cicer arietinum), methi (Trigonella foenum-graceum) and pea (Pisum sativum). Indian J agric Sci 1962, 32(Pt 4) 260-65

Joshi, H.C. & Mathus, Y.K. Notes on th the aphids of Rajasthan. Madras agric J 1967, 54(5): 239-43

Obviously Uniterm Indexing is not suited to such an arrangement of index entries which does not follow the conventional alphabetical sequence, but is oriented to the needs of a particular project.

A documentalist with training in library classification may be tempted to classify all these index entries according to some classification scheme to form a classified file, and then prepare an alphabetical subject index as a key to its contents. But any such attempt will disturb the existing pattern which is exclusively geared to specific needs of a service for compilation of this encyclopaedia. Besides, a classified order will entail a two-way search through alphabetical subject to the classified file instead of the present system of one-way direct approach to the contents of the index file.

Cross References

With progress of research, botanical names of some plants have either been changed or are likely to undergo alteration in future.

Index entries already made under such defunt botanical names as subject headings are not discarded, but are coordinated to the correct names through cross references.

In such cases, a correct name is correlated to the superceded name through cross reference entries implying that index entries exist under all these terms and an enquirer should preferably consult them also to have a comprehensive idea about the topic, e.g.,

Sterculia Spp.

See also	Erthropsis Pterocymbium Petrygota Scaphium

Besides guiding an enquirer from erroneous and superseded names to correct names, cross reference entries help to correlate synonyms including coordinate and subordinate terms, e.g.,

Urochloa	See also	Brachiaria
Vernonia	See also	Centratherum
Vitis	See also	Caryatia, cissus, Parthanocisus, Tetrastigma

These cross references are also used to inter-relate collateral terms, e.g.,

Textile industry	See also	Cotton industry Jute Industry Silk Industry Synthetic Fibres Synthetic Fibres Wool Industry

The nomenclature of plants is frequently rectified in conformity with the Rules of Botanical Nomenclature to eliminate discrepancies. Botanical names in current usage are referred from superseded ones by 'see' reference entries:-

Nothopanax	See	Polyscias
Panax Spp.	See	Nothopanax Polyscias Tieghemopanax
Pristimera	See	Reissantia

SDI Service

Subject bibliographies on any particular topic are typed out from index entries pertaining to them and supplied to the editorial staff when they commence writing articles on it. Then useful articles on this topic are regularly sought out from incoming periodicals, and analytical entries, prepared for them, are kept separately. Supplementary bibliographies are thereafter typed out from these subsidiary entries, and supplied to the editorial staff at specified intervals till the final drafts of papers are ready for the press.

These entries are, thereafter, containing the indexed information, are transferred to the adjacent library where they can be consulted with convenience.

Ancillary Service

An array of filing cabinets with systems hold literature files-- all arranged in an alphabetical order according to their subjects. These files contain bibliographies, lists of reference books, photocopies, pamphlets, reprints, abstracts, clippings from newspapers, standard specifications, drafts of articles, and correspondence relating to them - all arranged in a helpful sequence. In short, they contain all useful materials which can be accomodated inside them, and thus they hold out a vista of information within a limited space.

These files are sent to the editors for their consultation when they start compiling papers for the encyclopaedia. All documents, subsequently received, are also sent to them for their perusal and incorporation in literature files lying with them.

To Conclude

As bibliographies, supplied through the SDI service, contain only a list of citations, it would not have been considered as an adequate source of information but for the fact that all scientific periodicals - after they have been scrutinized by the technical personnel here - are sent to the editorial staff who screen screen them again to ensure if some useful information has not been indexed. In such an eventuality, they are again sent back to the Documentation section with their remarks. This ensures that no useful information, even of marginal value, is left out and nothing useful is missed. View points of indexing and editorial staff are thus made to concur ensuring that the 'noise' or the number of redundant entries are kept at a minimum

This system, which has gradually developed into its present form to reduce time and labour of the editorial staff involved in compilation of the encyclopaedia, has been found to work well, and may indeed serve as a guide to those who would like to undertake similar projects.

current documentation literature

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Aslib Proceedings [Aslib Proce]	63(1, 3, 4, 5)
Australian Library Journal [Aust Lib J]	18[6, 10] 19[1-4, 7-9)
Canadian Library Journal [Canadian Libr J]	26(4, 5)
Computer Journal [Computer J]	13(1)
Computer and Automation [Computers Automn]	19(5, 7)
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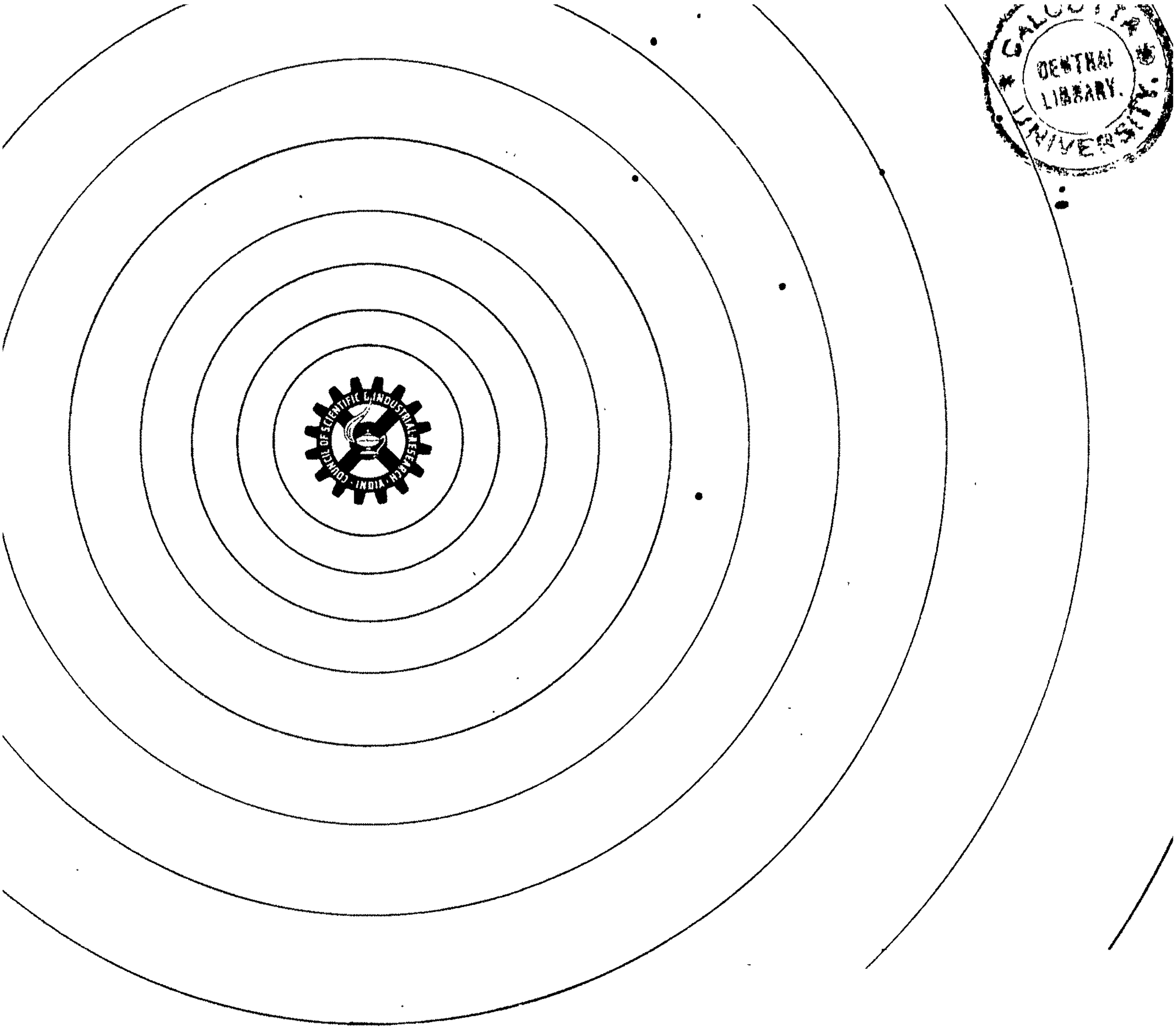

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The following paper is a very authentic depiction of the current science and technology information scene in Japan. In view of the wide interest in the topic we are reproducing the paper from the 'Library and Information Science', no. 7, 1969, a publication of the Mita Society of Library and Information Science of the Keio University, Japan. We are most grateful to Dr. Takashi Hashimoto, President of the Mita Society, for his gracious permission to reprint the paper and to Professor Takahisa Sawamoto, the author, for readily agreeing to our request to make this paper available to more number of readers through the pages of the *Annals**. — Ed.*

TOWARD A NATIONAL SCIENCE INFORMATION NETWORK IN JAPAN

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I. *Foreword*

The amount of science information has been rapidly increasing. It is estimated that the annual total of articles in world's science and technology journals must be between 2,000,000 and 3,000,000, and that the number will double hereafter every eight or ten years. Already, Japanese learned societies, colleges and universities, and various research institutions in all fields of science and technology which contribute to the output of information exceed 10,000.

As it is obvious that growth in scientific and technological fields influences tremendously the development of the nation, it has been recognized as a national requirement that comprehensive document and information services be established and maintained so that the research worker can make rapid use of new information produced by others and thereby benefit his society.

So far, however, Japan has not developed adequate national document-and information-handling systems. In this respect, our country appears to be in an embryonic or under-developed stage despite its remarkably advanced industrial achievements. In the present paper, a few ideas or draft plans for a national network of information systems in the fields of science and technology are to be introduced and discussed.

Recognition of the importance of scientific and technical developments by the Government was signalized by the establishment of the Science and Technology Agency in the Prime Minister's Office in May of 1956. In August of the next year, under the supervision of the Agency, the Japan Information Center of Science and Technology (JICST) came into being. Since then the JICST has been engaged in such activities as acquiring foreign and domestic journals in science and technology, publishing abstracts, and providing reprographic copies to meet the needs in scientific research and development.

Although the JICST's aim, as enunciated when it was created, is to serve relevant information to research workers in all fields of science and technology, its services have actually been limited to the physical sciences, and the biological sciences have been neglected. The present state and future plans of the JICST will be discussed in the following section.

In the meantime, in the fields of the bio-agricultural sciences, librarians and documentalists, working with experiment stations and research institutions, belonging to the Agricultural, Forestry and Fisheries Research Council of the Ministry of Agriculture and Forestry, have been engaged since 1965 in study of plans for a "National Central Agricultural Library". They reached a tentative conclusion in April of 1966, and since then their group has re-examined the 1966 plan and continued its basic studies. Details of their studies are to be introduced in Section III.

Medical librarianship is another field in which a national information network has been considered. Although it is the most advanced librarianship in Japan, it embraces no single medical library qualified to assume the responsibilities of serving as the national medical library. A possible Japanese pattern for a national information network in medicine was first discussed in 1968. It was then suggested that the JICST might provide a satisfactory national center for medical information in close cooperation with the Japan Medical Library Association and its 51 member libraries. Further comment on national medical information services is given in Section IV.

The handling of documents and information on a national scale has over the past fifteen years been referred to in various reports of the Science Council of Japan, the Council for Science and Technology, the Science and Technology Agency, and other bodies and even been a subject of recommendations. This year (1969), a task force, composed of sixteen specialists on information problems in science and technology worked on this topic and drew up a report very recently which dealt with (1) policy for national information systems for science and technology; (2) international cooperation with overseas information centres; (3) education and training for science information technologists, and (4) information-handling technology. These efforts toward national science information systems are to be described in Section V.

The various ideas and plans concerning a national system or network mentioned above came into existence rather independently, with few efforts being made to coordinate them. Therefore, there is little uniformity in their basic concepts. In the last section of this paper, an attempt is made to coordinate the different proposals.

II. *Japan Information Centre of Science and Technology and its Future Plans*

The Japan Information Center of Science and Technology (JICST) was founded in August of 1957 as a non-profit-making foundation under the provisions of the Law concerning the Japan Information Center of Science and Technology. The JICST's aim was to be the central organization for information activities serving the advancement of science and technology in Japan. To achieve this aim, it was expected to collect comprehensively information having to do with science and technology throughout the world, to process and store this information systematically, and to disseminate it as quickly as possible to organizations and individuals regularly or upon special request. It also was authorized to offer other far-reaching services and to encourage information workers in local organizations and assist them in solving problems difficult to tackle by themselves.

From ¥ 125,395,000 in the first fiscal year, 1957-58, the budget of the JICST has expanded to ¥ 1,373,755,000 for the 1969-70 fiscal year. Its permanent staff in the initial stage totaled 62; for 1969-70, it has 332 employees [1]. With the increases in its annual expenditure and personnel, its services naturally have grown.

In 1958-59, the JICST acquired about 3,400 journals, of which 2,694 were from foreign countries, and abstracted from them a total of 93,000 articles. By 1968-69, it was taking in a little more than 6,600 journals, of which 4,427 were foreign, from which about 396,000 abstracts were made. Other than scientific and technical journals, it has been collecting patent specifications from the United States of America, Great Britain, and West Germany, from which 23,000 to 44,000 abstracts have been made annually [2]. These abstracts of journal articles and patent specifications have been published in series titled Current Bibliography on Science and Technology and Foreign Patent News. The former is the major JICST publication. In 1958-59, only four sections, covering general and mechanical engineering, electrical engineering, chemistry and the chemical industry, and the earth sciences, mining and metallurgy, were published, but since 1968-69 the number of sections has been increased to nine with the addition of the following five fields: civil engineering and architecture, and applied physics, atomic energy (isotopes and radiation chemistry), management science, and domestic chemistry (or Complete Chemical Abstracts of Japan). Other JICST periodicals include Technical Information for Small Industries, Technical Highlights from Overseas, Annual Index to Japanese Patents and Documentation and Information [3]. As for the disciplines covered by the JICST's abstracts and indexes, they so far have been confined mainly to the physical sciences.

Other than publishing abstracts and indexes, the JICST has been providing such services in response to requests from organizations and individuals as reprography, translation, literature search, and special abstracting. It also maintains a reading room. From 23,504 in 1958-59, requests for reprography jumped to 334,000 in 1968-69. It also renders inter-institutional reproduction service as well as circulating periodical contents sheets. As for translation, the number of requests increased from 577 in 1958-59 to 2,148 in 1968-69. It translates from foreign languages to Japanese and vice versa. Literature or patent search requests grew from 594 in 1958-59 to 2,148 in 1968-69 [4].

Research and development activities for improvement of the JICST's services have been focussed on the designing of mechanized information storage and retrieval systems. Soon after its foundation, the JICST organized the Mechanized IR Study Committee, headed by a standing director. Its studies led to the creation in 1961 of JEIPAC (JICST Electronic Information Processing Automatic Computer), a system which used a TOSBAC 4100 as its main component. After the introduction of the JEIPAC system, further studies and experiments on information retrieval were carried out, inputting information about metallurgical articles, coded according to the ASM-SLA classification scheme. A series of other experiments on document information retrieval in regard to chemical compounds was carried out with the JEIPAC system in 1961, and the results of these experiments yielded many suggestions useful in planning future mechanized information retrieval systems. To solve problems created by the special features of the Japanese written language, which regularly consists of "Kanji" and "Kana" elements and may use alpha-numeric characters as well, research projects were carried out. One was on indexing by KWIC and KWOC in Japanese, and another on development of JAKIS (Japanese Keyword Indexing Simulator System). Both of these were begun in 1965 [5].

These studies on mechanized information retrieval culminated in the installation of an electronic computer system in December of 1967, consisting of an FACOM 230-50 as the main computer with a main memory unit, an F2520B, into which may be put information expressed in 1861 "Kanji", 158 "Kana" syllables, 65 Roman letters, 66 Russian letters, 33 Greek letters, 10 Arabic and 20 Roman numerals, 199 symbols, etc. and from which may be obtained information expressed with a total of 3,071 linguistic elements, including different type faces. To do so, "Kanji" teletypewriters and flexowriters were combined as the input device, and a high-speed "Kanji" line-printer, JEM 3800, was newly developed as the output device [6].

The new computer system at the JICST is now in operation or definitely scheduled for the following purposes: the automatic editing and photo-composition for periodical issues and annual indexes of the series titled Current Bibliography on Science and Technology, processing approximately 30,000 abstracts a month; keywords controls and preparation of thesauri in the Japanese language; selective dissemination of information (SDI) service; keeping records of information about source documents, and processing data on routine business operations.

The JICST has grown in accordance with three expansion plans. Before the inauguration of the center, the Science and Technology Agency drafted for it a program for the three-year period from 1957 to 1960. After operation began and consideration was given to operational realities, the budget and other matters, the center set up the first expansion program [7] for the same period. In accordance with this plan, the objectives for 1960-61 were listed as follows (actual achievements in 1960-61 are shown in parentheses):

Subject fields handled: physical sciences

Acquisitions: foreign serials, 2,500 (2,461) titles foreign patent specifications, 20,000 (21,799) items, domestic serials, 1,000 (717) titles

Information processing: foreign articles abstracted, 150,000 (145,000) foreign patents abstracted 20,000 (22,000)

Services: sales of abstract journals, 6,000 (5,622) copies services upon request, 100,000 (118,857) requests

Some of the achievements were rather surprisingly in excess of the scheduled goals. In the final stage of the plan, however, it was realized that the center still had such unsatisfactory deficiencies as the limitation of subject fields to the physical sciences, the poorness of serial acquisitions, with resultant lack of comprehensiveness in information storage, the lack of domestic information processing, and the staff's inadequacy of skill in literature and information searches.

Along lines laid down in the report and recommendations on general basic policies for the promotion of science and technology from 1960 to 1970 which the Council for Science and Technology had submitted to the Prime Minister, the JICST's second expansion plan, for the five-year period of 1961-66 [8], was adopted in September of 1960. It included such new projects as addition of biology and biochemistry to the subject fields, provision of comprehensive information storage and retrieval, mechanization of information processing, handling of domestically originated information, and other information services, but most of these new projects could not be carried out as planned. Some of the planned and achieved services in 1965-66 were as follows (performances in parentheses):

Acquisitions: foreign serials, 6,000 (4,081) titles
  foreign patent specifications, 100,000 (32,882) items
  domestic serials, 2,000 (2,010) titles

Information processing: foreign articles abstracted, 400,000 (258,000)
  domestic articles abstracted, 100,000 (27,300)
  foreign patents abstracted, 100,000 (29,800)

Services: sales of abstract journals, ¥ 150,000,000, (¥ 177,741,000)
  services upon request, ¥ 250,000,000, (¥ 156,463,000)

While the Council for Science and Technology was re-examining its first report, the center, reviewing its achievements, issued a ten-year plan setting goals to be reached by 1976 [9]. This plan embraced the comprehensiveness of the fields to be handled, the relevancy of information to be made available, and the rapidity of information dissemination. It set the following objectives: (1) the JICST should acquire 10,000 foreign serials as soon as possible and build up the number to 15,000 by 1975, as well as an exhaustive collection of domestic titles; (2) the center should establish rationalized information processing systems by 1970, processing domestic physical science articles comprehensively from 1966, starting abstracting in basic medical and agricultural fields from 1966, and expanding the scope of the patent literature so that it would abstract a total of 700,000 articles and patent specifications by the year set as the goal; (3) the center should mechanize the processes for compilation of its indexing journals and the storage and retrieval of information by employing modern machines and equipment; and (4) the center should provide relevant information rapidly by issuing special editions of abstracts, by KWIC indexing, by rapid reviews, etc., through use of automatic equipment for reprographic services, by organization of capable translators throughout the nation and placing translated articles in various depositories for the convenience of users, and by providing important secondary publications from throughout the world and by maintaining a strong staff for services.

In this ten-year plan, emphasis was put on (1) research on and development of information processing; (2) mechanization of all sorts of work in the center; (3) improvement of the treatment of the staff; (4) training of professional staff members; (5) establishments of more branch offices, and (6) strengthening of international cooperation.

Meantime, the special committee on science information of the Council for Science and Technology worked on the national policies for strengthening of science information activities in 1965 and its draft report was completed in August of the same year. The report had considerable impact on the JICST's administration, with the result that it reviewed and revised its ten-year plan and drew up in December of 1965 its first five-year (1966-71) expansion plan as an all-round science information center [10]. According to this plan, which currently is being implemented, the JICST is to develop into an all-round national science information center befitting our modern age, expanding the subject fields covered by it to all scientific and technical disciplines, improving the comprehensiveness, relevancy and rapidity of its services, employing mechanization on a large-scale and establishing a research institute for information science and technology and a training school for science information specialists in affiliation with the center. The objectives to be achieved by 1971 are as follows:

- Acquisitions: serials in physical sciences, 10,200 titles
  - serials in medical sciences, 6,200 titles
  - serials in agricultural sciences, 1,400 titles
  - technical reports, 50,000 items
  - secondary sources of information, 500 titles
  - patent specifications, 275,000 items
- Information processing: abstracting of physical sciences articles, 510,000 items
  - abstracting of medical sciences articles, 280,000 items
  - abstracting of agricultural sciences articles, 70,000 items
  - abstracting of patent specifications, 100,000 items
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  - micro-fiche, 910,000 sheets
  - storage on magnetic tape, 910,000 items

Services of the JICST in 1970-71 will be expanded in such areas as the publishing of abstracts, indexes, digests, reviews, contents sheets, English editions of abstracts, etc., reprography, translation and the fulfillment of requests. To carry out these services satisfactorily, the center will develop and introduce such mechanized devices as a large scale electronic computer, a "Kanji" line-printer, an automatic micro-fiche filing machine, and an automatic machine for reprography.

The size of the budget of the JICST in 1971 is estimated to be 3,700 million yen, and its full-time staff will have 850 persons.

It is true that the JICST as our only national science information center has developed tremendously and widened the horizon of its services during its first ten years. An examination of the subject fields covered by it reveals, however, its abstracting journals are concerned with only part of the physical sciences. Its working collections now contain more than 7,000 titles of scientific journals, and an extension of services to the life sciences has just recently been started with the acquisition of about 900 titles of medical journals. Although it is called the Japan Information Center of Science and Technology, it perhaps should be renamed the "Japan Information Center for Physical Sciences and Engineering" unless it thoroughly expands its services to include the life sciences as is stipulated in its ten-year plan.

How the JICST may contribute to future developments in science information will be discussed in the final section of this paper.

III. *Conception of the Japanese Central Agricultural Library*

It was decided by the Cabinet in September, 1961, to move major governmental research institutions from the crowded Tokyo Metropolitan area to a suburban area. In accordance with this decision, 11 or 12 major ones among the 30 research institutions under the jurisdiction of the Ministry of Agriculture and Foresty have been selected to join in an agriculture research center to be developed in a large area at the foot of Mt. Tsukuba, northeast of Tokyo in Ibaraki prefecture.

In 1962, the Secretariat of the Agricultural, Forestry and Fisheries Research Council carried out a survey of the libraries and library services of the research institutions affiliated with the Ministry [11] and, in 1963, it surveyed user needs for library materials and research information [12]. These two surveys revealed that the libraries needed more funds to improve their services, and that the research workers whom they served needed and were demanding, among other things, secondary sources of information, especially domestic ones, and quick reprographic and translation services. As one research worker pointed out, there were many unnecessary duplicates of periodicals and other materials in various research stations, and as it was practically impossible to provide an ideally comprehensive collection of all needed materials for each institution, it was highly desirable to establish a coordinating center to give quick and efficient library and information services to all of them at minimum cost.

After inquiries, it became apparent to agricultural documentalists in the Ministry of Agriculture and Forestry that the JICST would not engage in agricultural information processing as soon as they had hoped. As a consequence, there was advocacy of steps to consider and develop a plan for establishing a central agricultural library in parallel with the planning for the new agricultural research center.

A voluntary study group was organized by librarians and documentalists of the Agricultural Ministry's research institutions in the Tokyo area, who held many meetings during the period from December, 1964, through April, 1965, to examine and discuss their problems, including the plan for a new central research library. They published in March, 1966, the results of their efforts as a draft report [13] to which was attached a separate paper titled "Draft Plan for a Central Library" [14]. Meantime, working groups were organized in the Secretariat of the Council to explore possible facilities for common utilization by the personnel of the projected agricultural research center in Tsukuba. From April to June 1966, they considered the plan which the study group had drafted and concluded that the establishment of such a national central agricultural library was essential for research [15]. Further deliberations on the plan took place from October, 1967, to February, 1968, in which attention was given to such matters as the relationship between the central library and the research institutions' individual libraries and a possible schedule for bringing the library into existence. No changes in the fundamentals of the draft plan were recommended.

The "Draft Plan" dealt with (1) the demands for the central library; (2) the favorable opportunity for the establishment of such a central library which the creation of the agricultural research center in Tsukuba offered; (3) the major services to be provided by the library; (4) its personnel requirements; (5) its administrative organization; (6) its facilities; and (7) its budget. Some of the more interesting details of the plan follow.

As for its acquisitions policy, the library would endeavor to assemble as complete a collection as possible of the world's literature related to agriculture, forestry and fisheries but in principle would exclude patent documents. About 5,000 titles of foreign serials and 3,000 titles of Japanese would be sought.

In regard to public services, the plan states that the library would provide not only circulation of books and reproduction of journal articles but also such reference services as quick response to urgent inquiries, literature search, compilation of subject bibliographies, and publication of indexes, a union catalog and similar reference tools. The library also would promote interlibrary cooperation among agricultural science libraries internationally and domestically, acting as a national clearinghouse concerning agricultural science information.

Concerning the staff, the draft plan points out that at least 80 to 120 full-time employees would be needed, of whom at least 10 should be highly professional in information technology and more than 20 others should be trained in general librarianship and/or subject specialities.

Speaking of facilities, the plan recommends that the site of the library be as central as possible in relation to the experiment stations and research institutions which it is to serve. It suggests about 9,000 m^2 of space, including 2,650 m^2 for stack space, 1,200 m^2 for administrative and business, technical processing, indexing and computer areas, and 1,900 m^2 as architectural or non-assignable space. It estimates, on the basis of 1963 prices, that the building would cost between 540 and 680 million yen.

For the initial annual budget, the plan calls for 190-200 million yen, approximately equal to 5.7% of the grand total of the 1963-64 budgets of the eleven research institutions which were then expected to move to the Tsukuba area. It suggests that the sliding system should be adopted for budgetting.

It must be noted that the conception of the national agricultural library prepared by the Agricultural Ministry's librarians and documentalists is very much like that of the U.S. National Agricultural Library, but it excludes the Library of the Ministry of Agriculture and Forestry, whereas the American NAL includes a strong collection on agricultural administration taken over from the former U.S. Department of Agriculture Library. Those engaged in the planning for the national central agricultural library have tended to keep its services within the traditional scope and been rather hesitant to introduce new information services. Those who know the present retarded status of agricultural librarianship in Japan will realize that any plans must be programmed step by step on the basis of actual capabilities.

When a panel on the facilities for common utilization in the Tsukuba area was organized by the Science and Technology Agency in April, 1968, however, some divergencies in thinking became apparent among the panel members. This panel's task was to explore the potentialities of a regional or local scientific information center serving the entire nation and limited to the agricultural sciences.

Out of the panel's deliberations came agreement on certain basic aspects of the information center to be established in Tsukuba [16]. Its principal activity would be to render information services; it would promote interinstitutional and interlibrary cooperation on information exchange in the area; it would act as a telecommunication or switching center among research institutions and libraries in the area as well as between them and the JICST, NDL, Patent Agency, etc. in Tokyo with such equipment as a Facsimile-Telex, and it would have a computer system so as to disseminate information rapidly to its users.

This proposed information center would acquire domestic and foreign governmental documents (including patent specifications), proceedings of various conferences and meetings, reports by private institutions, standards, records of information on magnetic tapes or in microforms, and reports of a clearinghouse to be planned later. It would not collect books and journals regularly acquired by its client libraries. It would rely on the projected national agricultural library to produce secondary sources of Japanese agricultural information in addition to providing its regular library services [17].

Concerning the organizational position of the central agricultural library in the Government, the working group in the Secretariat of the Agricultural, Forestry and Fisheries Research Council suggested two patterns. One was that it might be attached initially to the Council and develop into a central library, absorbing the National Institute of Agricultural Sciences Library. The other was for it to take form within the National Institute of Agricultural Sciences and eventually evolve into an independent central library including the Institute's library [18].

The possible place of a national agricultural library and documentation center in the national information network will be discussed in the final section.

IV. A National Information Network for Medicine in Japan

In the field of medicine, the Japan Medical Library Association has long been promoting inter-library cooperative activities among its 51 member medical libraries, of which 46 belong to medical schools. Since the foundation of the association, it has emphasized interlibrary loan services, and such services have been facilitated by the compilation of a union catalog of western medical books and a union list of medical journals collected by the libraries affiliated with the association. In the 1966-67 fiscal year, 42,381 items of library materials, some of them in the form of photo copies, were provided to and by member libraries. Essential for interlibrary loans is the maintenance of up-to-date records of periodical acquisitions. Tokyo University Medical Library, which has installed a TOSBAC 3400 computer, has been experimenting with the processing and maintenance of such records, and Keio University Medical Library has developed an automatic system for the processing of serials records with a TOSBAC 5400. These two institutions are going to develop automatic programs for the preparation of a union list of medical serials and a union catalog of medical books in Japan. When these projects are fully implemented, an up-to-date union list of serials and an up-to-date union catalog of books in libraries will be maintained by the association and be available to member libraries at any time.

Meantime, the Keio University Medical Library began indexing Japanese medical journal articles under a contract with the U. S. National Library of Medicine (NLM) in July, 1966. Since then, the MEDLARS Project Section of the Keio Medical Library has annually sent input information processed from more than 10, 000 articles in 128 selected Japanese medical periodicals.

Of all document services in Japan, the medical library network developed by the Japan Medical Library Association is the most advanced in Japanese library circles. However, medical information services have never been developed comparably.

For a medical information network in Japan, an essential element which is lacking is a national central medical library and information center comparable to the NLM in the United States. Also lacking is recognition by users and librarians in general of the importance of information services in the field of medicine.

An analysis of data in a survey of medical libraries in Japan has shown that none of the existing medical libraries could possibly become the national center for such a purpose. Leaders among medical librarians, therefore, are inclined to look to the Japan Information Center of Science and Technology (JICST) to assume the role of the national medical information center [19, 20].

Orginally, the JICST had a plan to serve the medical field from 1960. It postponed the date for this to 1967, as stated in its five-year expansion plan prepared in December of 1965, and the work actually started in July of 1968. According to a rough estimate, the JICST's present processing capacity in abstracting in all field is 320, 000 articles per year, needing an annual expenditure of ¥500, 000, 000 and a total of 180 full-time members on the document- and information-handling staff. If an information center with a similar capacity had to process medical information, it would need a budget of about ¥300, 000, 000 and 120 people on its document- and information-handling staff. Such requirements make it prohibitive to establish a new independent medical information center for a country such as Japan [21]. As a consequence, the administration of the JICST came to favor the introduction of MEDLARS into Japan to reduce the cost of medical information input. Since 1965, the JICST has been negotiating with the NLM concerning adoption of MEDLARS to Japan. At the same time, it has been making efforts to consolidate domestic efforts through special cooperation with Keio and a few other leading medical libraries.

Would it be appropriate to organize a national medical information network by connecting the member libraries of the Japan Medical Library Association with the present JICST? Such a network might not be accessible to medical research workers and clinicians belonging to institutions with libraries which are non-members of the association. Also there is some question as to whether the present JICST's policy can be applied satisfactorily to the medical field. These matters will be discussed further when the writer takes up the national scientific information network problems.

V. Plans for National Document - and Information - Handling Systems for all Areas of Science and Technology in Japan

When we consider the facilities alreadv available for handling on a national basis documents and/or information in all areas of science and technology, we must turn first to the National Diet Library and then to the Ministry of Education.

The National Diet Library, corresponding roughly to the Library of Congress in the United States, has been acquiring, storing, cataloging and indexing scientific and technical materials, but its scientific information services are not very strong. It has by now amassed about 200, 000 volumes of scientific and technical books and monographs, both foreign and domestic, about 10, 000 titles of foreign scientific periodicals and about 2, 500 titles of such domestic periodicals. Its Japanese Periodicals Indexes series contains a monthly coverage of natural science, but its processing of scientific journal articles is inadequate both quantitatively and qualitatively.

In the Education Ministry, the Information and (Academic) Libraries Section of the Bureau of Higher Education and Sciences has been compiling a union list of scientific periodicals collected by Japanese universities, which is a very useful tool to locate specific issues of periodicals.

The organization which took the initiative in considering a national academic library system was the Science Council of Japan. During the period of 1954-55, the Council members discussed national science library system for Japan and considered the establishment of a central science library and some specialized and regional libraries as essential components of the national system [22]. Although actual recommendations to the Government did not emerge from this discussion, it is interesting that as long ago as 1954 and 1955 scholars were aware of deficiencies in the existing systems of retrieving documents that contain needed information and that they at least gave thought to recommending to the Government the establishment of a science document-handling system of nationwide scope. Later, the Council made two important sets of recommendations on the improvement and modernization of academic libraries in 1961 [23] and 1964 [24]. The 1964 recommendations, in addition to rationalization of management and operations, called for establishment of a cooperative system of academic libraries, education and training of a professional staff to handle highly academic information, adequate budgets, and creation of an adequate governmental organization capable of guiding and advising academic institutions on modernization of their libraries. In 1965, the Council made recommendations under the heading of "Five-year Plan for Scientific Research" [25] in which the humanities and the social sciences were included. This plan, to be implemented from 1967 through 1971, emphasized the importance of the development and use of computers, communication networks, and information-handling techniques and management. Among the recommendations, consisting of five sections, was one urging the establishment of regional academic information centers and specialized information centers to be coordinated into a national academic information network. Especially noteworthy is that early in its thinking about the matters the Science Council of Japan aimed at the provision of academic libraries in which more emphasis would be put on the humanities and the social sciences. It recommended not only the development of electronic computers for library use but also more systematic consideration of the problems of academic libraries. Although its recommendations were not accepted as fully as it had hoped, its idea of connecting computer networks with information-handling systems gradually achieved recognition and came to be perpetuated in reports and recommendations made by the Council for Science and Technology.

The Council for Science and Technology, inaugurated in 1959 directly under the Prime Minister, has responsibility for considering and establishing policies for the promotion of scientific and technical research and development. It submits reports and recommendations in reply to inquiries made by the Prime Minister. Its first task was to prepare a comprehensive report and recommendations on basic policies for the promotion of science and technology in the 1960-70 period. Completed in October, 1960, the report [26] established objectives and recommended specific policies for the development of scientific and technological manpower, consolidation of research activities, and promotion of information dissemination, international exchanges and general diffusion of knowledge. It also suggested improvements in existing systems. This report was the first to discuss science information problems and related policies at the national level in a fairly comprehensive manner. For national information handling systems, the report suggested development of a national center to handle information in not only physical sciences but also medical and agricultural sciences, with special information centers and data centers to be linked with it.

About five years after this first report was submitted to the Prime Minister, the Council took a fresh look at it. In response to new demands created by recent developments in science and technology and to changes in international and domestic circumstances, a revised report was issued in August, 1966 [27], in which greater emphasis was placed on the strengthening of science and technology information services. Its Chapter 3, devoted entirely to the problems of science document and information services and related matters, stressed the importance of providing an effective system of scientific organizations charged with originating primary information and of strengthening document- and information-handling organizations. With regard to the latter, it gave major attention to a national information center for science and technology which would handle needed information comprehensively, supplemented and supported by specialized information centers to deal with information in special subject fields, data centers, science libraries, clearinghouses and other related agencies. The necessity for a national clearinghouse for scientific and technological information was stated forcefully in the revised report, and its functions were outlined. It is interesting to note that the so-called Weinberg Report, issued in 1963, stressing the clearinghouse idea, seems to have exerted some influence on the thinking which led to the revision of the report. Later, a small group called the "Discussion Meeting on the Clearinghouse Functions" was organized in October of 1966, and out of its discussions came a report which was released in June, 1968 [28].

In early 1968, under sponsorship of the Promotion and Management Sections of the Science and Technology Agency, a working group was organized to analyze the current status of communication of information in science and technology in Japan, to explore possible patterns for future information services, and to formulate a governmental policy on such matters. At the end of 1968, a plan for the development of a national information system for science and technology was published as a result of the group's efforts [29]. It pointed out the need for (1) development of a national general science information center where all scientific and technical documents would be acquired, abstracted and indexed and which would supply stored information to users; (2) development of special information centers to acquire and supply documents and information about their contents of a nature which the general center could not afford to handle; (3) establishment of data centers to collect, evaluate, process and supply experimental data, etc. ; (4) improvement of the services of libraries engaged

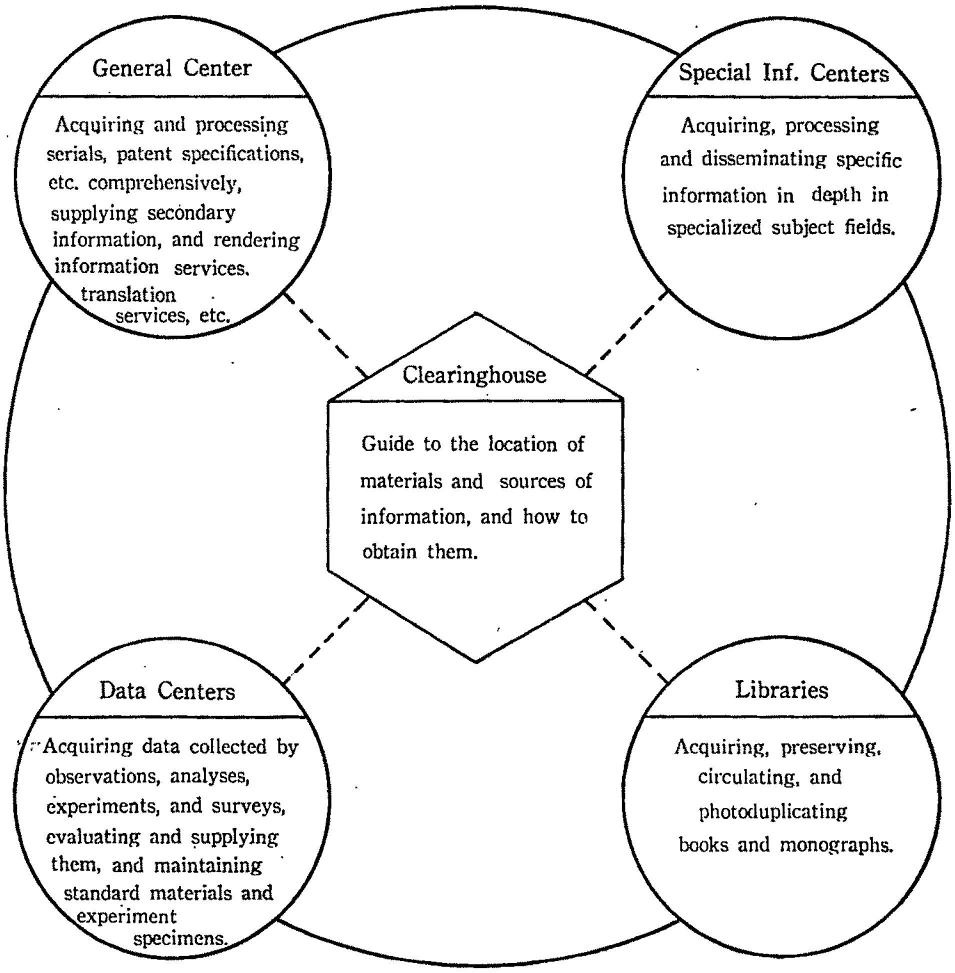
General Center
Acquiring and processing serials, patent specifications, etc. comprehensively, supplying secondary information, and rendering information services, translation services, etc.
Special Inf. Centers
Acquiring, processing and disseminating specific information in depth in specialized subject fields.
Clearinghouse
Guide to the location of materials and sources of information, and how to obtain them.
Data Centers
Acquiring data collected by observations, analyses, experiments, and surveys, evaluating and supplying them, and maintaining standard materials and experiment specimens.
Libraries
Acquiring, preserving, circulating, and photoduplicating books and monographs.

Fig. 1. A Proposed Scheme for Scientific and Technical Information Network (See B-36 in Appendix)

in collecting, processing and preserving scientific and technical literature and establishment of a clearinghouse to provide information about such matters as the location of unpublished reports and the resources of research institutions upon request. Such a network for scientific and technical information transfer is shown in Fig. 1.

To fulfill the plan, the following suggestions were made: (1) to enlarge and expand the present functions of the JICST, developing it into the general scientific information center, with mechanization of its procedures; (2) to consider more carefully the relationship of special information centers to the general information center development; (3) to experiment with certain pilot projects; (4) to establish cooperative programs with the National Diet Library, university libraries, public libraries and libraries of research institutions, and (5) to prepare within the JICST for the proposed clearinghouse program. Importance was attached also to the development of regional information centers to function as regional core organizations in information transfer and as liaison agencies between central systems and research workers in local research institutions. For the efficient operation of such systems, it was advocated that standardization and mechanization be promoted, that personnel be increased in number and given better training, and that international cooperative systems be improveed. Visualized in Fig. 2 is a five-year schedule for improving scientific information transfer systems.

The latest move concerning national information systems for science and technology came early in 1969. A task force composed of sixteen specialists on information problems in science and technology was organized under the 4th Committee, concerned with science information handling, of the Council for Science and Technology. The group discussed various problems for about half a year and drew up a report which was submitted to the 4th (Science Information) Committee in July. The report [30], confined to basic principles and recognizing present realities, discusses the following points: (1) establishment of the National Information System for Science and Technology (NIST); (2) cooperation with international scientific information systems; (3) development of manpower concerning science information transmission, and (4) development of techniques and methods for handling information.

A functional chart of the projected NIST is shown in in Fig. 3. The main function of the NIST headquarters is to coordinate the activities of its operating centers, specialized information and data centers and regional information service centers. The headquarters also has education and training functions and research and development functions. The weak point of the concept is that the national headquarters has administrative power over only the regional information centers and not over the operating centers, special information centers and data centers.

The functions of the operating centers and specialized information centers are more clearly defined in the report. To strengthen the central coordinating functions, it is recommended that there be a council for deliberating on NIST policies and that the central agency compile necessary directories to obviate the need for a clearinghouse, formulate various standards and criteria, handle international cooperation, extend technical and financial aid to various centers in cooperation with the Government, and plan and carry out projects for research on and development of techniques for the handling of information and training programs for the personnel within the NIST network. The report urges participation in international cooperative activities related to science information services and symbolizes the NIST headquarters as a "desk at the window of the country." To develop and maintain the entire network at a high level, the report recommends the creation of superior programs in selected universities for education of the professional staff, establishment of a central training institute on the advanced level, improved treatment for the professional staff members, the training of research workers in the use of science information systems, and so forth. As to the development of information handling systems, the report points out the emergence of automation in the compilation of secondary information, use of micro-images, magnetic tape storage of information and its recovery from them, standardization of information processing techniques and the combined use of computers and telecommunication systems.

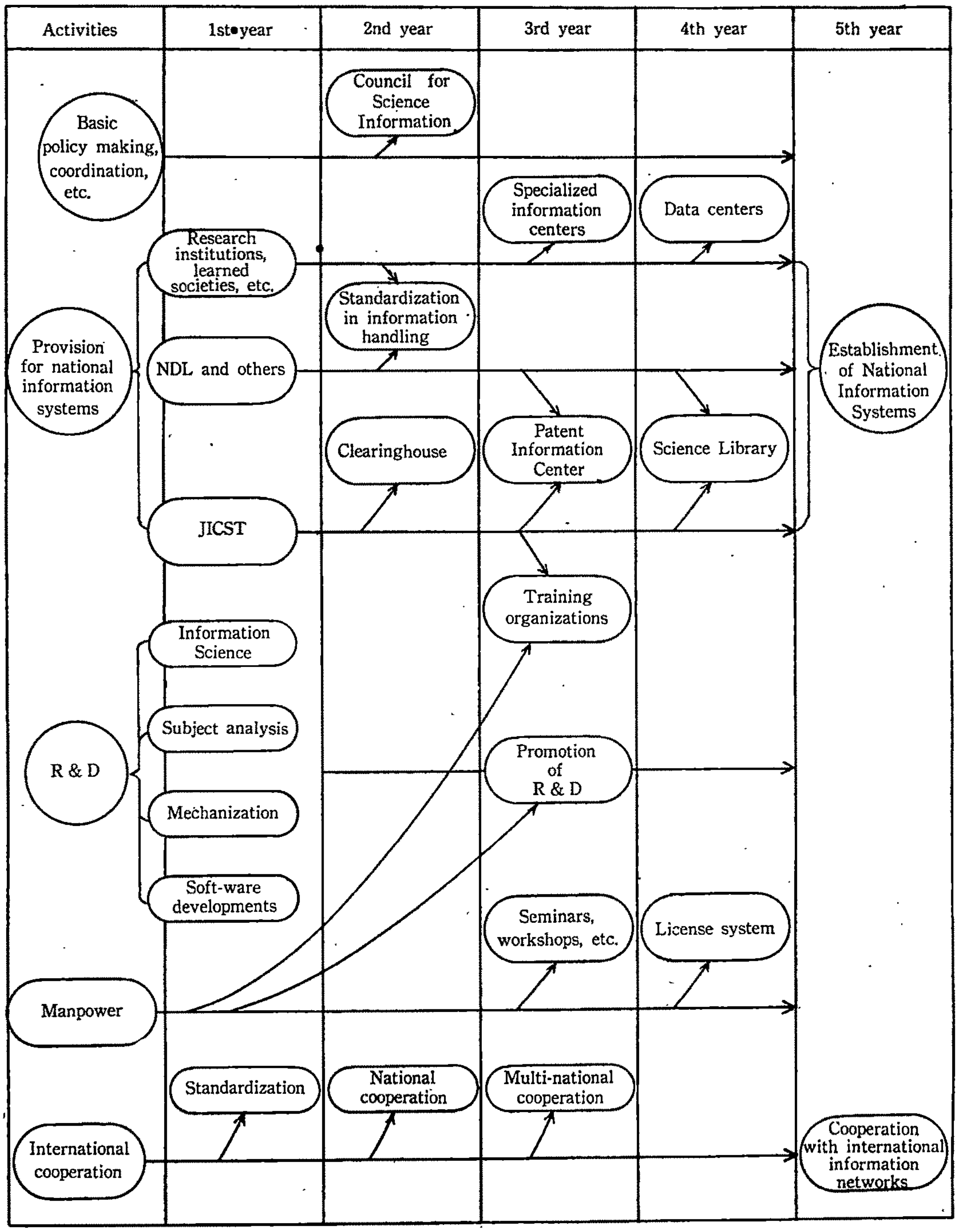
Activities
1st year
2nd year
3rd year
4th year
5th year
Basic policy making, coordination, etc.
Council for Science Information
Specialized information centers
Data centers
Research institutions, learned societies, etc.
Standardization in information handling
Provision for national information systems
NDL and others
Establishment of National Information Systems
Clearinghouse
Patent Information Center
Science Library
JICST
Training organizations
Information Science
Subject analysis
R & D
Promotion of R & D
Mechanization
Soft-ware developments
Seminars, workshops, etc.
License system
Manpower
Standardization
National cooperation
Multi-national cooperation
International cooperation
Cooperation with international information networks

Fig. 2. A Prospective Schedule for Promotion of Scientific and Technical Information Activities (See B-36 in Appendix)

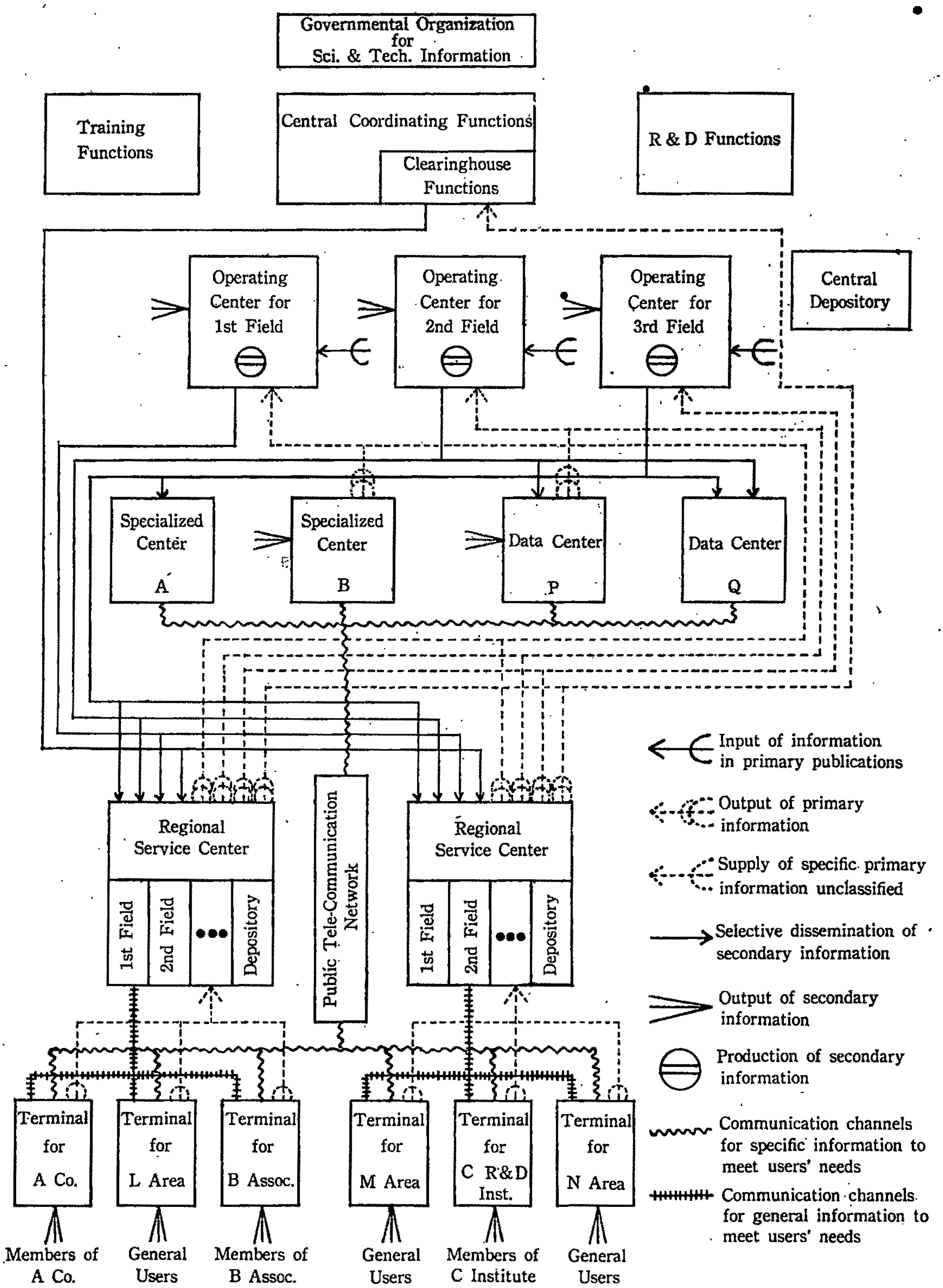
Governmental Organization for Sci. & Tech. Information
Training Functions
Central Coordinating Functions
Clearinghouse Functions
R & D Functions
Central Depository
Operating Center for 1st Field
Operating Center for 2nd Field
Operating Center for 3rd Field
Specialized Center A
Specialized Center B
Data Center P
Data Center Q
Regional Service Center
1st Field
2nd Field
Depository
Public Tele-Communication Network
Regional Service Center
1st Field
2nd Field
Depository
Terminal for A Co.
Terminal for L Area
Terminal for B Assoc.
Terminal for M Area
Terminal for C R&D Inst.
Terminal for N Area
Members of A Co.
General Users
Members of B Assoc.
General Users
Members of C Institute
General Users
Input of information in primary publications
Output of primary information
Supply of specific primary information unclassified
Selective dissemination of secondary information
Output of secondary information
Production of secondary information
Communication channels for specific information to meet users' needs
Communication channels for general information to meet users' needs

Fig. 3. NIST and the Flow of Scientific and Technical Information (See B-38 in Appendix)

VI. *An Approach to a National Science Information Network*

As we have seen in the foregoing sections, there exists a center for the processing of information and documents in the physical sciences, various plans for at least concepts of parallel centers in the fields of agricultural sciences and medical sciences, and an evolving body of policies with regard to national information systems for science and technology in comprehensive terms.

In the background of our planning to develop a comprehensive science information network for the nation, the following realities cannot be ignored:

1) The lack of a governmental agency strong enough to coordinate many small information units or systems scattered under the jurisdictions of various Ministries or other bodies.

2) The inadequacy of the scientific and technical information services of the National Diet Library (NDL).

3) The limited scope of the services provided by the Japan Information Center of Science and Technology (JICST), which do not cover the biological sciences.

4) The lack of libraries and information centers capable of nationwide service to research workers in the biological sciences.

5) The lack of some fundamental data essential for planning a national information network, such as studies of the needs of biological scientists in Japan and of the national capabilities for the education and training of science information personnel.

6) The necessity for some technical developments, not only in hardware but also in software, for use in the national information systems, and for new communication systems applicable to the national science information network.

7) The lack of knowledge and skills concerning the science information flow and use of document- and information-handling systems that should be possessed by scientists and technologists.

8) The inadequate appreciation of the importance of the national information systems and network on the part of the scientists concerned, the administrators under whom the scientists work and especially the top-level officials in the Ministries and other governmental units with responsibility for scientific and technological matters.

Though others could be added, the discussion here will be limited to the above problems.

1. The Science and Technology Agency (STA) of the Prime Minister's Office is perhaps theoretically in a position to coordinate various scientific research efforts within the governmental organization, but in actuality it has far too little authority to surmount the traditional resistance of each Ministry to giving up any of its domain. The agency in submitting its budget request for the 1969-70 fiscal year, requested a fund to establish a new section called the "Information Section," but it was not approved. Only if there is a strong executive agency in the Government with requisite authority can we hope to have a comprehensive science and technology information network of nationwide scope. This agency could be part of the STA, but it would have to be higher in rank and larger in scale than the proposed Information Section. It would formulate necessary policies and support their implementation on the basis made by the Council for Science and Technology. It should have long-range plans and maintain public relations. And it should, of course, coordinate the information services of all branches of the Government.

2. The NDL, the biggest library of the nation, has the Science and Technology Section in its Reference Department, which acquires about 10, 000 titles of foreign scientific serials. Nevertheless, it has not developed good information services for scientists. It was partly because of this deficiency that the JICST had to be established twelve years ago. The NDL's services are intended primarily for members of the Houses of Representatives and Councilors, who do not often request analyses of scientific papers in such depth as scientists requre. The Natural Science Section of the Periodicals Indexes produced by the NDL is not of great use to scientists. Rather than to attempt a major change in NDL policies and practices, it might be

wiser to establish a new national library, the "National Science Library," separated from the NDL. This new library concentrates on acquisition of books, monographs, reports and major journals in science and technology and on their preservation. It would as the central depository of the governments' scientific documents, and as a clearinghouse. From it the NDL could receive information on scientific books and monographs for the making of printed cards and information for such indexes of Japanese scientific articles of general nature as the Reader's Guide.

3. As was pointed out in Section II, the JICST has not been able in twelve years to correct the inadequacies in its services to biological scientists. The policy of depending on the Government for about half of its annual budget and on users for the rest was the original reason for the exclusion of biological sciences from the scope of its services. Although it recently has been making efforts to extend services to medical fields and then to agricultural fields, it is questionable whether it can treat these two different fields equally with the physical sciences and engineering. In the writer's opinion, it is feasible and would be more effective to develop two new information centers, perhaps called the "Medical Sciences Information Center," and the "Agricultural, Forestry and Fisheries Research Information Center," in parallel with which the operational parts of the present JICST could become the "Physical Sciences and Engineering Information Center." There is another important operation that the JICST has been carrying out, that is, the processing of patent specifications of foreign origin. This function should be more closely related with the Patent Agency Library. Perhaps a "Patent Information Center" could be created in coordination with the Ministry of International Trade and Industry. The functions of a general clearinghouse and a referral center for all of the information centers might be entrusted to the National Science Library. Operation of the central mechanized system, together with other operating functions, could be installed in an operations headquarters. This operations headquarters, the four document information centers for the three major scientific fields and patents, and the National Science Library would constitute the core of the national scientific document and information system. From this core, lines of coordination, or in certain cases lines of control, might go out to specialized information centers, data centers, and local terminals. If necessary, though the necessity is not likely, regional subcenters could be established to benefit local scientists. What is needed is a core. Its precise character can be debated, and there can be flexibility in the working out of details.

4. The fact that neither national libraries nor information centers for the medical and agricultural sciences exist in Japan may impose on the document- and information-handling systems of this country a pattern different from that in the United States of America. In the medical field, it has been suggested that a national medical information network be developed without a central medical library. The JICST, it has been argued, could develop information services related to the medical sciences. To the contrary, people in the Ministry of Agriculture and Forestry are enthusiastic about creating a central library which would include exhaustive agricultural coverage when the ten or more national research institutions move to a new scientific city to be developed at the foot of Mt. Tsukuba, while they seem not to be strongly interested in early establishment of a large-scale information center. No one can know with any confidence which of these alternatives would be more practical in the long run. It might be a good idea to experiment with both. In any case, were a central agricultural library to be established by the Ministry of Agriculture and Forestry, all agricultural scientists in agricultural colleges and agricultural departments of universities would want to receive services from the central library without discrimination between them and Ministry scientists.

In developing an information center for either medical or agricultural sciences, a special endeavor should be made to ensure that services can be rendered without charging users as much as the present JICST does in the fields of the physical sciences and engineering. It may be necessary to subsidize use of the center by research workers belonging to non-profit-making organizations.

5. A national survey of the information needs of physicists and chemists was carried out in 1968,[31] but the needs of those who use biological information have never been measured in depth or breadth. To develop a national information center for the biological

sciences, it would be essential to have the data which such a survey would disclose. It is understood that the Science and Technology Agency will carry out such a survey for agricultural scientists and technologists by the coming March.

If more subject fields are to be served, there will have to be an increase in science information personnel and a corresponding increase in teachers qualified to train them. We therefore must know how many qualified teachers are available at present and how many candidates can be counted on to develop into qualified teachers or trainers. We must also have data on translators capable of doing well in the biological sciences.

6. As the JICST has developed a computer system based on the FACOM 230-50, introduction of MEDLARS into Japan would compel us to face conversion problems. Similar problems might occur were ABLE's information storage on magnetic tapes to be transferred to Japan. In the agricultural sciences, not only such mechanical problems but also vocabulary problems are envisaged as being quite substantial. Establishment of standards in information handling is an urgent matter for not only international but also domestic reasons.

Technical aspects at communication systems should influence the policies for and the designing of national information networks. Or the flow of influence could be in the other direction. The development of data transmission systems, for example, might require changes in the governmental policy for Nippon Telephone and Telegraph Public Corporation.

7. It seems to be universally true that scientists and technologists do not fully know how to make the best use of libraries and information centers. To popularize such knowledge and impart the skills relevant to the flow of science information and the use of document- and information-handling systems, the curricula at all levels of education must be reviewed and properly adjusted. Especially in higher education, considerable effort should be made to have science professors teach their students correct skills in information retrieval. For this purpose, there is urgent national need for re-education of science professors, because more than 65, 000 students now are graduating annually from the scientific departments and graduate schools of universities without a bit of knowledge about or any skills in information handling.

8. Although there is a considerable number of leaders in scientific circles who fully recognize the importance of efficient information systems for the specific sciences in which they are interested, but very few of them have any appreciation of the importance of a national science information network incorporating all those systems. Most administrators of research institutions under whom scientists and technologists require information in their work seem to be quite indifferent toward a science information network on the national level. With few exceptions, top-level officials in the governmental departments that have research institutions affiliated with them do not regard the development of a nationwide science information network as a very urgent need. There are many reasons for their attitudes, including their old-fashioned educational backgrounds, the traditional sectionalism shared by both officials and academic people, and their lack of familiarity with systematic approaches to solutions. They create problems not only in developing the national science information network or systems but also in planning any national policies which involve changes in the regulations of several departments of the Government.

From the foregoing, the following general conclusion may be drawn:

As to the capping agency to supervise the entire science information network, there would seem to be merit in establishing a new Information Agency within the Prime Minister's Office. If this is not feasible, at least a new office on the "bureau" level in the Science and Technology Agency (STA) should be established. This office, which might be called the "Science and Technology Information Bureau (STIB)", should be responsible for the formulation of policies concerning the national science information network and its component systems, on the scope of responsibilities and activities, of governmental and non-governmental libraries and information centers, and on such related matters as the national science libraries, document information centers, referral services, clearinghouse functions and document depositories. The bureau should also work out legal aspects of the national network and systems, coordination with various governmental organizations, and long-range plans for development of the network. It also would have to enlighten the people concerned and maintain good public relations.

As for the national science information systems, it is debatable whether they should be set up as ordinary governmental units or under a public corporation. Past experience in this country would seem to suggest that it would be preferable to establish a new public corporation which would control all the different national science information systems, on the assumption that all governmental departments concerned would be amenable to giving substantial assistance to such a corporation, whereas they probably would be reluctant to help a competing governmental organization. It could be under the jurisdiction of the STIB. It will be named here the Japan Science and Technology Information Systems (JASTIS) Corporation, to be distinguished from the present JICST or the proposed NIST. See Fig. 4.

The JASTIS Headquarters would have components for such administrative functions as planning, controlling, staffing and for such operational services as central computer processing, printing and disseminating of information and translation. It would support an institute for research in and development of information science and technology which should be supervised by a special committee of the Council of Science and Technology.

Formulation of basic policies for the development of Japan's science information systems and network not only is an urgent national matter but also cannot be neglected from the international stand-point, because the nation has been originating a great amount of information in science and technology which is

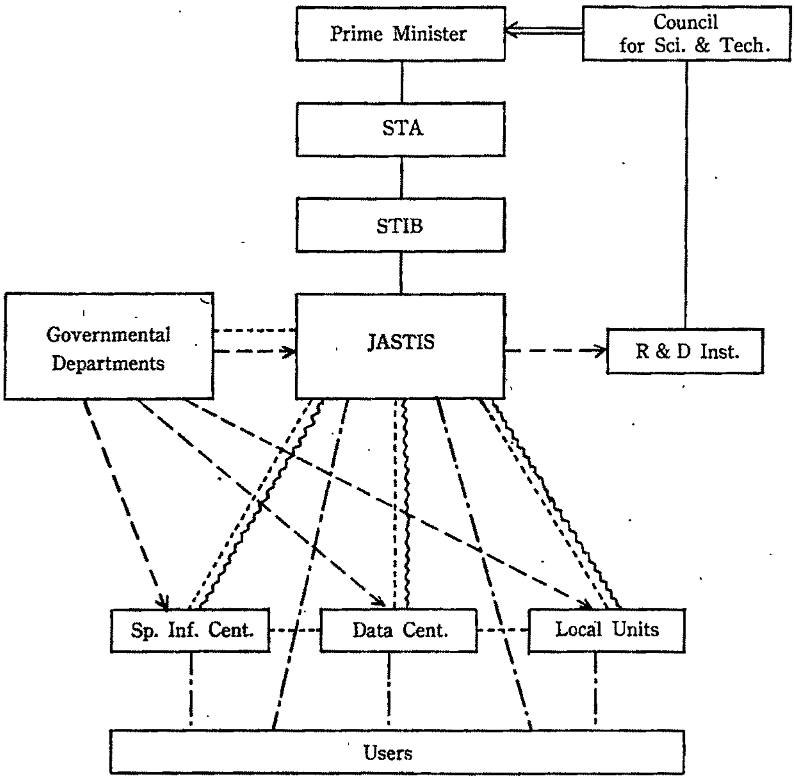

Fig. 4. Government of JASTIS and Its Functional Structure

———— line of control
———→ line of support
·········· coordination
—·—·—· line of service
∿∿∿∿∿ communication network for science information
⟸══ advisory capacity

of worldwide value. To handle and coordinate international matters, JASTIS should have an office to receive and send out information internationally.

As document-information handling subsystems, JASTIS would have the following information centers: the Physical Sciences and Engineering Information Center (PHEIC), doing largely what the present JICST is doing; the Medical Sciences Information Center (MESIC), handling medical, pharmaceutical, veterinary information; the Agricultural, Forestry and Fisheries Research Information Center (AFFRIC), processing agricultural, forestry and fisheries research information recorded in documents except for agricultural engineering and perhaps veterinary information and the Patent Information Center (PIC), looking after not only domestic but also foreign patent information available from patent specifications, of which the latter now is being processed by the JICST. In the future, still another center, devoted to documentary information concerning management science, economics, law, politics and other social sciences, might be developed. Pending the emergence of such a substantial social sciences information center, information about industrial management and agricultural management perhaps could be processed by the PHEIC and AFFRIC respectively.

Functioning as a central depository for scientific and technological documents, the projected new National Science Library (NSL) probably could satisfy the needs of scientists and the document information centres of JASTIS as well. The NSL could be a segregated division of the NDL or an entirely new establishment. It probably would be simpler and less troublesome to create a new library under the jurisdiction of the STIB. The National Central Agricultural Library (NCAL), planned by the people of the Agricultural, Forestry and Fisheries Research Council of the Ministry of Agriculture and Forestry, and other national libraries already in existence in or by such governmental bodies as the Industrial Science and Technology Agency and the Patent Agency probably ought to be amalgamated into the NSL or at least closely coordinated with it.

The core of JASTIS and its satellite information centers, together with the major national libraries, would constitute the national information systems as shown in Fig. 5.

There will be need for data centers in close relationship to research institutes, experimental stations and observatories. At least in so far as they concern themselves with data acquisitions, processing, storage and retrieval, they should be under JASTIS supervision.

With regard to communication technology, the Japan Telegraph and Telephone Public Corporation has an important role to play in formulating the national science information network. Its facilities and equipment should be utilized to develop information networks. Data transmission techniques must be designed to meet the demands of the science information network.

Concerning regional or district subcenters for science information, the writer's opinion differs from that found in all plans issued so far. The recommendations and suggestions for science information systems and networks have, without exception, claimed that it is essential to have regional or district information centers as subsystems of the national systems. Why do we need such regional centers in this small and homogeneous country? Geographically, our land has considerable length, but it is smaller than the State of California. If we wisely utilize modern tele-communication capabilities, inquiries from local research workers can be more satisfactorily and relevantly handled directly by the national centers than through regional subcenters.

Whatever else may be decided, however, if JASTIS is to come into being, there are certain major problems which must be faced squarely and solved. First of all are the manpower problems. We have very few professionally trained document and non-document information specialists. To meet the potential information demands of all Japanese scientists and technologists it is estimated that we shall need in 1975 at least 7,000 professional, sub-professional, and non-professional people for all aspects of information handling, of whom about 10-20 per cent will be necessary at the initial stage of the national systems. No time can be lost,

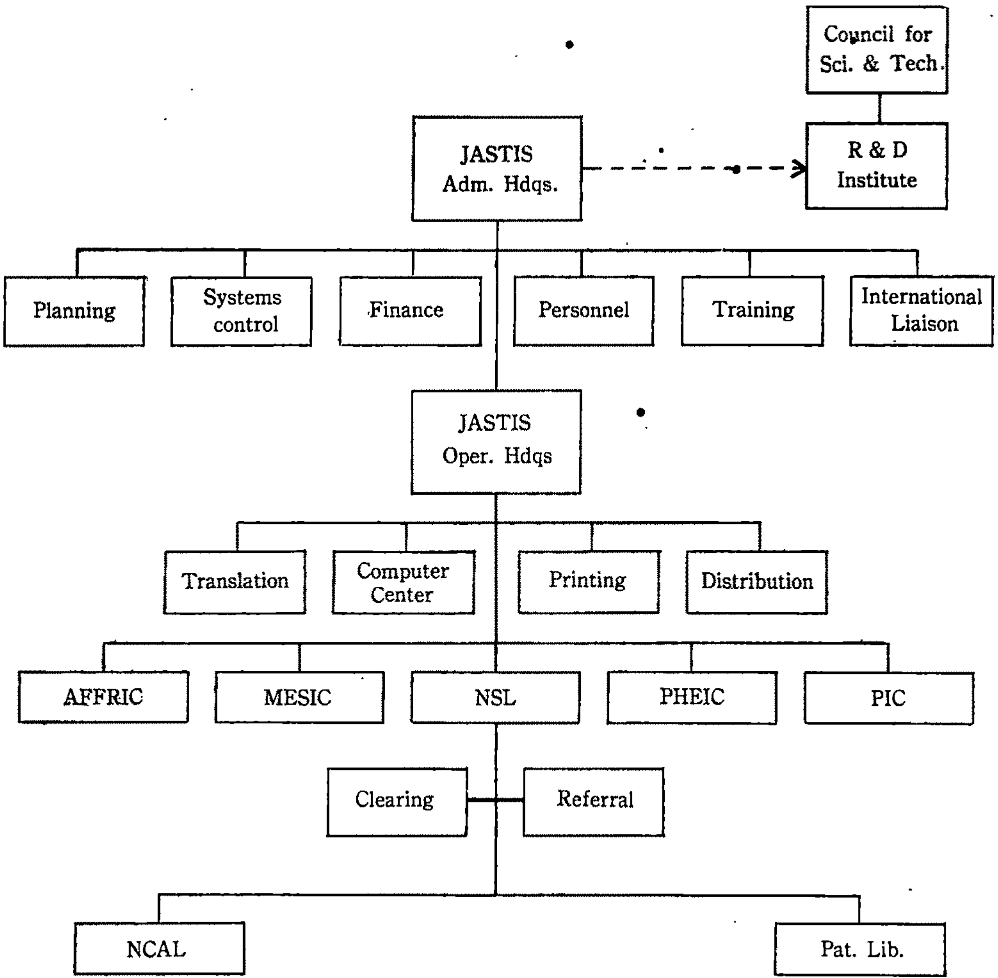

Fig. 5. Organization Chart of JASTIS
——— line of control
- - - → line of support

therefore, in ensuring that we have enough qualified teachers and well-equipped graduate schools of library and information science.

A second group of problems demanding early solution is concerned with our governmental machinery and the attitude of the public toward it. Scientists and governmental officials tend to look upon the existing division of duties and responsibilities within the Government's structure as entirely natural and not subject to change. It is extremely difficult, therefore, to coordinate various related matters coming under different departments of the Government. This is the main reason for the writer's insistence that there be a really strong capping agency for the science information network. Only with determined exertion of authority can the things be done which must be done. For example, bureaucratic red tape must be cut to provide substantial support for scientists working in non-profit research institutions so that the nation may benefit from their increased utilization of document information center. Bio-medical-agricultural information centers cannot be operated on the same financial basis as those for the physical sciences and engineering, where most of research workers are employed in industries and are usually better supported in their use of information than biological scientists. Various ministries of the Government should provide appropriate subsidies for individual scientists and scientific groups or scientific and technical information centers so that scientists and research workers in research institutions will have equal opportunities to make use of information centers. For example, the Ministry of Education and the Ministry of

Public Welfare could join in providing funds to support research staff members in medical schools and clinicians in hospitals when they need medical or related information from the MESIC, and agricultural research workers at public agricultural experimental stations as well as those in academic institutions could have easy access to the AFFRIC if the Ministry of Agriculture and Forestry and the Ministry of Education gave supports. In short, there is great need for a policy to provide appropriate support for research workers in non-profit organizations so that they may acquire the information they need in their research at a reasonable cost or without any charge at all.

Another important preliminary problem is that of the present curricula and educational methods in the various disciplines of science in our higher education. To make younger scientists familiar with the use of local and national scientific information systems can not be accomplished without re-education of their teachers in scientific disciplines about the effective use of modern information systems. This cannot be done in a short period. Perhaps as a stop-gap measure some intensive method to enlighten both young and older scientists about science information transfer systems can be devised. At the present moment we have no single promising conclusion to offer in relation to this problem.

Also a problem requiring early solution is that of improving the present local document-handling units that are supposed to be components of the national science information network. The capability of the network as a whole will depend upon the capabilities of each component. Even in the medical sciences, in which librarianship has been highly developed in Japan, the average medical library still lacks the capability to meet the information demands of doctors that have to be answered locally. It is imperative that local library and information units be enabled to meet local needs so that the national document information systems can display their proper capabilities without being hampered by need to give excessive attention to local needs. Many scientists are apt to think that if there is a fully equipped national scientific information system then no effort to develop better local libraries or information units will be required. As the laboratory worker needs his working collection in his laboratory, the scientist will always have to have his own well-developed collections that will answer his needs directly. The national scientific information centers will serve to overcome the shortages in local units but cannot replace them. Were the national efforts to develop various national information centers reduce the financial resources for development of substantial local libraries, construction of the national information network would be severely damaged.

The technical aspects of the national information systems and network are another area of important problems. Among them, connected with development of hardware and software, are the highly difficult problems of semantics and the standardization of the structure of information. What makes them especially difficult is the specific language used in this country, and it requires that greater effort be made in this country than in Western countries. In this connection, a strong research and development institute should be considered.

Although the topic of a high-level institute for information science and technology has been left to the last, it is certainly not the least in importance. Such an institute has not yet been developed in any university in this country, except in the limited sense of computer science with emphasis on hardware. Covering both hardware and software, a new institute for information science and technology should be established. It could be maintained and supported by the headquarters of JASTIS but should be independent from its control. It probably should be administered by members of a special group provided by the Fourth (Science Information) Committee of the Council for Science and Technology. Utilization of the institute's facilities and equipment for research and development purposes must be available to project research workers assembled from various academic institutions, information and/or data centers, or science libraries. While engaged in research work at the institute, they should be released from their ordinary work for one to two or three years until they have achieved their objectives.

The Council for Science and Technology will complete its report and recommendations by the end of the coming fall and then submit them to the Prime Minister. It is the writer's hope that its plan for the NIST, whatever it may be, will be broadly publicized and that before it is put into effect it will be shaped to reflect the views of the scientists who are to use the NIST.

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[Those with B- numbers are listed in the Appendix]

[1] B-14, p. 2.
[2] Ditto, p. 5.
[3] Ditto, p. 6.
[4] Ditto, p. 8.
[5] B-11, p. 234-244.
[6] B-12, B-13, and B-15.
[7] B-11, p. 133-135, and B-5.
[8] B-4, B-5, B-6, and B-11, p. 135-138 and also B-6.
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[19] B-25, p. 20-21.
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Appendix: Selected Bibliography on Japanese National Science Document and Information Centers or Systems

The items listed in this bibliography are limited to literature of importance written or reported by Japanese. There are five categories corresponding to the following divisions of the paper: I) General background information, II) JICST, III) National central agricultural library plan, IV) National medical information network, and V) Plans for national information systems covering every field of science and technology. Items are listed in chronological order in each category.

I. General Background Information

B-1 Japan Documentation Society. Science Information in Japan. [1st. ed.] 74p. and 2nd. rev. ed. 192p. Tokyo, The Society, 1962 and 1967 respectively.

B-2 KIKUCHI T: Scientific and Technical Information in Japan. American Documentation 1967, 18(4), 250-52.

B-3 KOBAYASHI Y: Development of a Comprehensive Network for Scientific and Technical Information in Japan. Library Trends 1969, 17(3), 258-66.

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B-4 Japan Information Center of Science and Technology. The Second 5-year Expansion Plan, 1961-1966. Tokyo, the Center, Sept. 1960. 4p. (In Japanese)

B-5 Japan Information Center of Science and Technology. Results of the First Expansion Plan and Prospects of the Second Expansion Plan. Tokyo, the Center, Aug. 1961. 11p. (In Japanese).

B-6 Japan Information Center of Science and Technology. The Present Status and the Future Programme. Tokyo, The Center [1963] 19p.

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III. National Central Agricultural Library Plan

B-16 SAWAMOTO T: Agricultural Science Libraries in Japan. Library Science 1965, 3, 107-19.

B-17 Ministry of Agriculture and Forestry. Secretariat of the Agricultural, Forestry and Fisheries Research Council. Research and Information Section. Report of the Study Meeting on the Library Administration and Management (Working Draft). Tokyo, the Section, March 1966. 107p. (In Japanese).

B-18 Ministry of Agriculture and Forestry. Secretariat of the Agricultural, Forestry and Fisheries Research Council. Research and Information Section. Tentative Plan for the Establishment of the Central Agricultural Library (A separate volume attached to the Report of the "Study Meeting on the Library Administration and Management (Working Draft). Tokyo, the Section, March 1966. 8p. (In Japanese).

B-19 ISHIHARA K, ITO T, SASAKI T: Agricultural Library Network in Japan. (Paper presented at the 11th Pacific Science Congress, Tokyo, etc., 3 weeks from Aug. 22, 1966) (Unpublished).

B-20 Ministry of Agriculture and Forestry. Secretariat of the Agricultural, Forestry and Fisheries Research Council. Reports of the Working Group on Common Utilities (Libraries). Tokyo, the Secretariat, April 1968. 161p. (In Japanese).

B-21 ITO T: Outline of the Conception of the Central Agricultural Library. (A paper submitted to the Fifth Panel of the Study Group on Common Utilities for a New Research and Academic Community to be Developed in the Tsukuba Area) 30 May 1968. 11p. (Unpublished, in Japanese).

B-22 ITO T: Memorandum on Information Networks for Agriculture, Forestry and Fisheries. [1969] 6p. (Unpublished, in Japanese).

IV. National Medical Information Netwrok

B-23 TSUDA Y: Trends in the Development of Information Networks and Document-Handling Systems, in Fuji Film Co. Documentation Aided by the Minicopy System 1968, 8p. (In Japanese).

B-24 Roundtable Talk. On the Future of Medical Information Activities. Information and Documentation, 11(4), 1968, 11(4), 192-201.

B-25 TSUDA Y: National Information Network in Medicine. Library and Information Science 1968, No. 6, 1-26. (In Japanese).

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V. Plans for National Information Systems Covering Every Field of Science and Technology

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AREA STUDY PROGRAMS AND NON-WESTERN COURSES IN AMERICAN UNIVERSITIES AND COLLEGES AND THE LIBRARY

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Area study programs and non-western courses in institutions of higher education require availability of books and other source materials from and about the areas to be studied. Academic libraries have to develop collections of source materials in support of academic programs. They are facing several problems in meeting the challenge posed by area study programs and non-western courses. Much has been done during the sixties with the support of foundations and the National Defence Education Act of the U.S. Government. Indian Universities have begun to offer programs dealing with several areas of the world. University libraries have to support them with appropriate materials. American experience in this area may be of interest to academic librarians in India.

American higher education has passed through several significant changes since the founding of Harvard College in 1636. It has been greatly influenced by the British system at the undergraduate level and the German system at the graduate level. It has now come to its own and is in turn influencing higher education everywhere. It is an exciting story of change and development, both in breadth and depth, of problems and progress closely connected with the society at large. The coming of area study programs dealing with almost every part of the world, into American colleges and universities with an emphasis on non-western areas is of recent origin. It is affecting higher education at graduate and undergraduate levels across the nation. It has significant implications for the society at large and has a considerable effect on college and university libraries.

Area Study Programs: What it is

The concept of area study program combines the study of the uncommonly taught languages of the world with more and more courses in those non western civilizations which speak the languages. It has made the humanist, the social scientist and the historian work as a team in the language and area studies focusing on man in a changing world. The Committee on World Area Research of the Social Science Research Council has set up the following criteria for the ideal area study program:

1. Official university recognition and support of the program.
2. Adequate library resources for teaching and research in the area.
3. Competent instruction in the principal languages of the area.
4. Offerings in at least 5 pertinent subjects in addition to language instruction.
5. Some specific mechanism for integrating the area studies.
6. An area research program.
7. Emphasis on the contemporary aspects of the area.

Factors Promoting Area Study Programs

The multiplication of cultures and view points in international contacts, ideological tensions among modern nations and the rising role of cultural affairs as elements of foreign policy have introduced new forces, new tensions and new potentialities into institutions of higher education in every country of the world. This is more pronounced in case of United States ever since its emergence as a super power of the world and its deliberate involvement in world affairs. During World War II, Federal Government realised the great need for people who knew the many languages of the world and the civilizations of the people who spoke those languages. The launching of the first Sputnik on October 4, 1957 by the Russians prompted immediate action and created a sense of urgency. The result was National Defence Education Act of 1958 which effectively dramatised federal interest and readiness to support language and area studies. It gave a new meaning and added strength to such programs on a national scale, by providing matching funds to academic institutions. This was a big step in the development of area studies.

In recent years leaders of education have realised the dangers of intellectual aloofness and cultural snobbishness. They have recognised the need to know world's civilizations till recently considered unimportant. A study of non-western areas is now looked upon as an integral part of liberal education. It enlarges a student's contact with varieties of human experience and enables him to see himself and his own culture in perspective. This realisation has promoted area studies and non-western courses in academic institutions.

The number of foreign students and scholars in American colleges and universities is steadily increasing since World War II. There were 134,959 foreign students [1] and 12,659 scholars [2] from almost every country in the world in 1969-70 in American Academic Institutions. It is indeed hard to find a campus that does not have a foreign student. Similarly there are many American scholars and students working abroad. Their number is steadily increasing ever since the coming of President Truman's point four program and the Agency for International Development. Fullbright-Hays Act of 1961 augmented NDEA support by providing funds for travel and study abroad by American scholars and students of non-western studies. There were about 25,117 American students regularly enrolled in foreign colleges and universities in 1968-69 [3] and 5,310 U.S. scholars working abroad in 1969-70 [4]. Such massive contacts have created a suitable atmosphere for the growth and general acceptance of area studies in academic institutions.

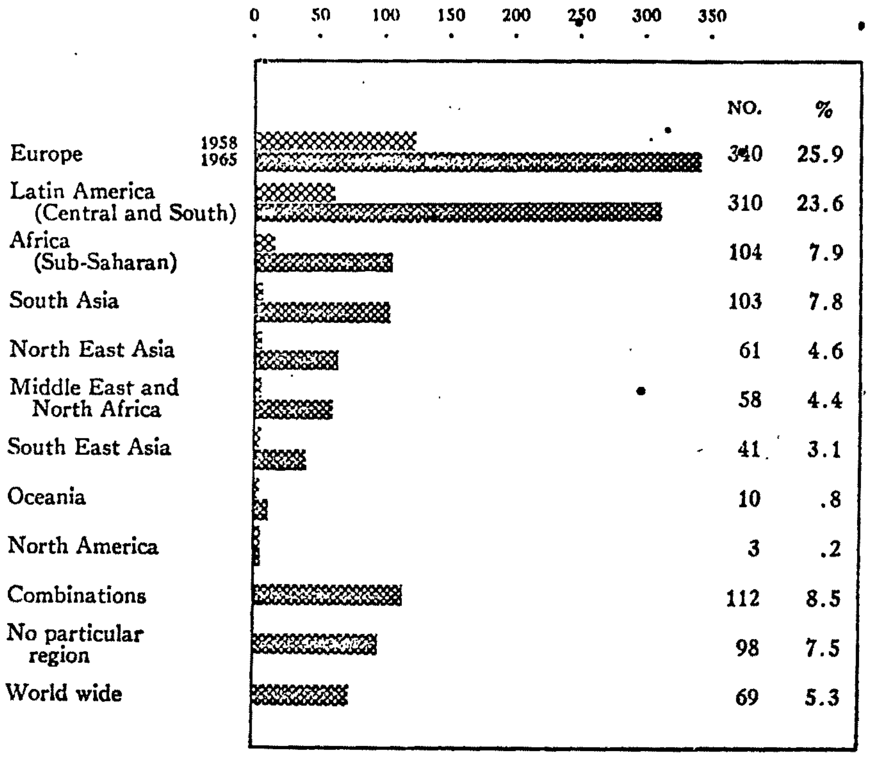
Further, major foundations have supported the growth of area studies from the very beginning. Rockefeller Foundation supported such programs even in 1930's when it was considered a revolutionary educational advance. Ford Foundation granted 26 million dollars to 15 major universities including California, Chicago, Columbia and Cornell during 1959-63 in support of area studies. It also supported efforts by undergraduate colleges to add non-western courses to the main stream of liberal learning. Foundation support has been a crucial factor in the growth of area studies. The Social Science Research Council and the American Council of Learned Societies have played key roles in the evolution of area studies since 1940's. They have discussed the needs of training and research, have offered grants-in-aid, have sponsored conferences and have stimulated bibliographical research in area studies. All these factors have caused an unprecedented growth in area study programs and non-western courses in academic institutions.

The concept of language and area study programs is a new and pervasive force in American higher education. It has made a visible impact on the liberal arts colleges and the graduate schools. Many small colleges now offer courses in non-western areas and provide an opportunity to study abroad as part of liberal education. According to a survey of East-West center of the University of Hawaii, there were 1,314 international programs in 396 colleges and universities in United States during the year 1965 [5]. Several programs lead to master's and doctoral degrees. They aim to prepare specialists for deep and comprehensive understanding of the languages of areas such as South, Southeast, and East Asia; the Near East; Africa; Latin America; the Soviet Union and East Europe which were relatively neglected in American scholarship. The chart in the following page shows the number of programs in regions of the world [6].

Area Study Programs and the Library

The area study programs of universities have a great impact on their libraries. This is also true of small college libraries that have to support non-western courses to some extent. They are called upon to acquire appropriate materials and to provide adequate service Horace Poleman of the Orientalia Division of the Library of Congress maintains that a college library ought to have at least 3,000 titles before it could meet the normal demands of undergraduate students, while a research library should have at its command not less than 25,000

AREA STUDY PROGRAMS



titles to support courses about South Asia. This is also true of other areas to a large extent. Libraries that have to support graduate study and research in area study are particularly facing a challenge. They are confronted with a host of new and tough problems. The four major problems are the following:

1. Developing adequate collections.
2. Preparing them for use.
3. Getting qualified personnel.
4. Obtaining necessary financial support.

Developing Adequate Collections

Developing adequate library resources to support Area Study Programs is a formidable job full of problems. Many of the works involved are in foreign languages and are published in foreign countries with diverse customs in the book trade. Often, bibliographical control necessary for the selection of materials does not exist. In some parts of the world central or efficient book trade organizations are not present. There is dearth of selective bibliographical guides to current monographs and serial publications dealing with several areas. There is a lack of up-to-date descriptions of American library resources in some areas. Libraries need to acquire current materials as well as old materials to fill the existing gaps. Generally, buying old materials presents tougher problems involving expense, energy and expertise. The major proportion of the task can be understood better when we consider the Area Study collections of some major university libraries.

Columbia University [7]

Area	Far Eastern Study Program	
Degrees granted	M.A., and Ph.D.	
Library resources in 1970	180,375	Chinese language materials
	99,651	Japanese language materials
	11,700	Korean language materials
	700	Tibetan language materials
	18,169	Western language materials

Harvard University: Harvard Yenching Institute [8]

Area	Far Eastern Study Program
Degrees granted	M.A. and Ph.D.
Library resources in 1970	450,955 volumes covering materials in Chinese, Japanese, Korean, Manchu, Mongolian and Tibetan languages.

There is a wide difference in the number of courses offered and the library resources among academic institutions

The size and complexity of the problems of collection development has made inter-library co-operation a necessity and has proved its usefulness for all concerned. Farmington Plan of 1940's is an early example of co-operative effort in acquiring foreign materials. It was sponsored by the Association of Research Libraries. It was designed to assure coverage somewhere in United States of all important monographs, either through assignment of responsibility by subjects for publications from Western Europe or through assignment by country for the rest of the world. It was a plan of national responsibility for assuring minimum coverage of resources from all parts of the world rather than co-operative buying for any library interested. However, all benefited through reports of acquisitions in the National Union Catalog and through inter-library loans. The Co-operative Acquisition Project of the Library of Congress Mission to Europe in 1944-48 is another example of cooperation in developing American library resources for Area studies. These made libraries realise the advantages of sharing responsibilities in developing collections on a nation wide scale which they could never have done alone. The Association of Research Libraries was also instrumental in improving access to newspapers from all world areas-- an important research resource through a foreign newspaper micro-film project. The Library of Congress now microfilms and disseminates non-western newspapers. Resources and Technical Services Division of A.L.A., also provides active service in this area through Union Catalogs, Union Serial lists and cooperative cataloging activities. Collection development in non-western fields has now become an essential part of acquisitions programs of many college and university libraries.

Preparing the Collection for Use

Acquiring library materials to support area studies is only the beginning of library responsibilities. The classification and cataloging of such material also presents several problems. The diverse nature of materials — they may be charts, maps, pictures, manuscripts, etc. -- and their languages present peculiar problems. Librarians with language skills are needed to handle them. Such librarians need to have ability to deal with multidisciplinary materials as well as with scholars of different subjects. Once the collection is prepared for use, the library has to decide whether to have the materials as special collections in a separate area or to disperse them throughout the library according to the classification system in use. Finding suitable space and equipment for the housing of these materials is part of the organizational problem. The question of centralised cooperative cataloging and the possibilities are being considered.

Problem of Qualified Personnel

Acquisition, processing, and more so— the use of library collection mainly depends on personnel who have the required qualifications. They need to have language skills, knowledge of concerned areas and ability to deal with scholars of different subjects in addition to traditional library education. It is indeed hard to find such well qualified librarians. The question of adequate compensation is part of the problem. Some libraries have tried to provide limited in-service training.

Area study programs and non-western courses have significant implications for library education. Library schools have to take note of these developments in evolving their instructional programs. There is limited activity in this area at this time. Some library schools are trying to provide certain skills through short term institutes and workshops dealing with materials of the different areas of the world. The Graduate School of Library Science of the University of Hawaii offers special courses to prepare librarians who can handle Asian materials effectively. It also conducts summer institutes in Asian librarianship. Graduate School of Library Science of the University of Texas offers a degree program in Latin American Librarianship with the cooperation of Latin American Study Department of the University. Graduate School of Library and Information Sciences of the University of Pittsburgh offers a course in Latin American Bibliography. The Library School of University of Wisconsin is developing a doctoral program with the cooperation of the department of Indian Studies. The University of Chicago conducted a conference in 1965 dealing with 'Area Studies and the Library', which examined the many aspects of the present situation and pointed the way forward. Several programs at post-master's level may be started in the years to come.

Financial Support to the Library

Financial support to academic libraries is needed for various activities like collection development, processing and use of the library materials dealing with area studies. It is a highly expensive venture of great proportions. Libraries have so far secured financial support in this area of their work through several sources. Ford Foundation, Rockefeller Foundation and other foundations have provided funds to academic libraries for collection development and for salaries of personnel in their projects to support area studies. N.D.E.A. Title VI funds also have aided libraries in these two areas. N.D.E.A.'s funds are to be matched by an equal amount by the receiving institutions. The third continuous source has been the regular budget of the libraries coming from institutional funds. Financial support has always been far less than what is needed and it has often hampered library activities.

Present Library Resources in Area Studies

East Europe

Traditional American interest in Europe and the immediate political concerns resulting from Russia's emergence as a super power have prompted great activity in the development of American library resources in this area. It is in fact the most comprehensive of any non-western area since World War II. Library collection in major U.S. libraries are quite adequate to support Slavic programs at graduate level. Acquisition of current material is possible through established sources of book trade and do not present great problems. However, there are some gaps that call for retrospective acquisition.

Latin America

In spite of the close relationship between the United States and Latin America, the development of library resources in this area has been very inadequate till recently. The recognition of several problems in the acquisition of Latin American library materials lead to the organization of a series of seminars since 1956. These have resulted in corrective action through a coöperative book buying plan organised by a commercial book dealer of New York. Ford Foundation has recently offered support to strengthen Latin American Study Programs in American colleges and universities. They are growing in numbers. Much needs to be done in this area.

Far East

Library collection interests in this area center around Japan, Korea and the two Chinas. Current publications of Japan are easily available through normal trade channels. However, there is difficulty in securing Japanese Government publications. The material dealing with South Korea and the Republic of China is readily available. But, materials dealing with North Korea and Red China are presenting tough problems. Several microfilming projects supported by the Foundations and the Federal Government were recently completed in Hong Kong and have relieved the situation to some extent.

Africa

Development of library collection in African studies has to deal with publications of former colonial powers as well as with those of the newly emerging nations. It has been easy to get materials from South Africa since it has a well organised book trade. Farmington plan has helped to some extent in acquiring African materials. African Studies Association of United States is active in this field. Library of Congress has recently established an African Section with support from Carnegie Corporation. It is also considering a project to microfilm African newspapers. However, there is much to be done. Productive efforts are now in operation in United Arab Republic and Israel under Public Law 480 program of the Library of Congress which utilises U.S. owned foreign currencies in some countries made available after meeting priority needs. Much material has come to United States since 1962 under this program to 19 research libraries. They include newspapers, periodicals and government publications. An additional 300 American libraries get limited number of English language publications under P. L. 480 program. Greater efforts are needed.

South and South East Asia

American library resources in this area have received considerable attention since 1960. P. L. 480 program operations are very successful in case of India and Pakistan. 18 U.S. research libraries have received extensive material while 300 libraries got limited English language publications. This program covered Burma and Indonesia in 1963. P. L. 480 offices issue monthly lists of acquisitions which are widely distributed to scholars in U.S. During the first 18 months of this program more than 1.1 million items from India were acquired. This shows the magnitude of operations. Participating libraries pay nominal amount to cover hard dollar amounts needed for administrative purpose. It has demonstrated the advantages of joint buying by a trained staff working directly in the concerned country. Acquisition of current material covering this area is satisfactory, but, there is much to be done in retrospective collection building.

Conclusion

Attention is now paid to provide proper bibliographic control of all material acquired through various sources. Efforts are made to share information via various news letters and bulletins. There are some programs for the reproduction of out-of-print books and several microfilming projects covering newspapers, archives, and serials. Descriptive accounts of area resources of libraries, bibliographies and research guides are being issued. Attempts are made to evolve transliteration schemes. These reflect the progress American libraries are making in meeting the challenge of area study programs in institutions of higher education.

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THE PROBLEMS OF NOTATION AND FACETED CLASSIFICATION

E G Sukhmaneva

A number of characteristics or main requirements of notation in library classification is given:-

1. Notation system cannot exist by itself or be primarily independent of the classification system; it should reflect the differences as well as the many sided relationship between the concepts.
2. The notation should be short and simple.
3. It should be possible to include newly arising concepts without disturbing the general structure of the system, i.e., to ensure the expansibility of the classification system.

In the light of these requirements, it is shown that the notation system of facet classification has advantages over other systems.

Not all systems of library classification which came into existence in recent years are of equal interest from the point of view of notation. Firstly, because foreign experts in classification in their search for a very good basis for notation often pay less attention to the scientific and the logical aspect of classification itself in the name of mechanical simplicity of finding information. Secondly, authors of the new classification systems abroad often solve this problem in an one sided way without taking into consideration the experiences accumulated in this field. Many examples can be cited wherein one of the requirements of a satisfactory system of notation is taken as the important one, while others are simply ignored.

Thus the French specialists in classification (Cordonier, de Grolier and others) considered ease in remembering class number as the main criterion. This arises in alphabetic pronounciation of the syllables. Their system is based on the Latin alphabet on French pronounciation. It is true that pronounciability is a useful quality of notation. But phonetics is inconsistent and such a classification cannot be an international one.

The Polish scientist Z. Dobrovolsky (International Institute of Welding at Paris) considers brevity of the class number as the most important quality. His system is accordingly called 'Notational system with short symbols' [1].

The brevity of the class number is achieved in an original manner. If in the common systems the class number for basic concepts has the least number of symbols, then in the Dobrovolsky system the final heading i. e. narrow specialised concepts are represented by single digits and the generalised concepts are represented as derivatives from these minute ones. Thus, if the final headings are represented as a, b, c, d, e then the main heading will have the number a/e or simply ae. Such a notation is based on the assumption that at present the demand for narrow specialised documents exceeds that for documents of a general character. In Dobrovolsky's system there are positive aspects. But on the whole it develops only one quality of a notational system, namely brevity.

One can give an example of a notational system based only on one of the rules of mnemonics. Merta and Toman [2] (Center for Scientific Information, Czechoslovakian Academy of Sciences) worked out a faceted classification with mnemonic features, for verifying the effectiveness of 4 systems of mechanised retrieval. In this system of classification each letter of the class number corresponds to the first letters of the words in the headings. For example J T means journals, technical and so on. But the authors of this system, according to their acknowledgements, could not stick to this principle fully and they had to employ non-mnemonic notation which they represented by apostrophe.

The Requirements of a Notational System in Library Classification

What are the requirements of a notational system of library classification? First, we can not speak of a notational system without its relationship with the structure of a classification. The basis of any systematisation is the order of the very subject and not of the criterion. In other words symbolisation cannot exist by itself without an organisation of the concepts of the scheme with all their many sided relations. If this is a linear organisation comprehending the law from general to the particular, accordingly we can understand the sequence of construction of the notation. Thus in Decimal Classification a brief class number reflects a more general concept which within itself is subordinated by more minute class numbers of the 2nd, 3rd etc. stages. If it is a multi-dimensional faceted classification then each element of its class number strictly corresponds to a single concept of one or other facet of a definite category and expresses the logical relations of one concept with others.

The structure of a classification system is the basis according to which the notation both in its main and auxillary elements are verified. By understanding the structure of a classification system, we understand the principles of construction, of its notation and vice-versa. Secondly, the principal requirement for any notational system is the way relations and differences between concepts are reflected closely and in all their aspects-- this requirement is the very substance of a notational system. It has a direct bearing on the fact what form the class numbers will have. In other words the class numbers can be brief or long, can be read and pronounced easily or with difficulty, one and the same concept in different subjects of the scheme can be represented alike or differently in two places, the class numbers at one stage of division can have the same or different number of symbols etc. The second requirement of a modern notational system is brevity and simplicity. In this connection it may be noted that too much brevity in notation reduces their expressiveness, specially in mechanised retrieval, which leads to retrieval 'noise' i.e. errors in retrieval arising from inaccurate transcription of the notation.

Brevity in its turn depends on the length of the base of notation and on the uniformity of the distribution of symbols between each stage of subdivision. We had referred to one method of achieving brevity in the notational base [1]. The brevity of this base depends as a whole on the total number of symbols used in any system of classification. Letter notations alone or numerical notations alone are logical but they are more unwieldy and are more difficult to remember. A mixed base notation expands the notational base condensing thereby the individual class numbers; it is more easily understandable and more easily retained, but too much expansion of the mixed base notation complicates the system. Thus in the Soviet BBK, the employment of the letters of the Russian alphabet along with numerals has expanded the notational base. Although the class numbers of the system are brief and can be easily memorised; however, the use of letters such as З,О,Ч have complicated its application in Union Republics and foreign countries. At the same time the employment of numerical notation alone in UDC has contracted its notational base which has adversely affected the logical construction of the system and brevity of the class numbers.

One of the essential requirements for a satisfactory notational system is the simplicity of its symbols. One more quality of a notational system, namely, mnemonics forms part of this concept, apart from easy readability and pronounciability. Some authors interpret this concept more widely than easy memorisability because of uniform reflection of related concepts. S.R. Ranganathan and his school have developed a theory of scheduled and non-scheduled mnemonics. Classification systems which are constructed by taking into consideration rules of mnemonics, acquire execeptionally consistent character. "Plans of arrangements" which are introduced in certain sections of BBK and the tables of general and special divisions can serve as an example of mnemonies in this system of classification. But in BBK the mnemonics is elementary and occasional and is introduced only where the classification of the very science force the compilers to reflect general regularity in the structure of the scheme. For example there is a well worked out table of "Plans of Arrangements" for inorganic chemistry according to compounds and common sub-divisions for organic and inorganic chemistry according to the properties and transformations, but neither of these is present in the physical chemistry section. The UDC table is still less consistent in this respect [3].

Third but not least important requirement in a satisfactory notational system is 'flexibility' i.e. the classification system must permit a redistribution of concepts without violation of its structure. In foreign literature this is called "Vitality" [viable, Fr] or "Hospitality" of the notational system. However accurately a classification system reflects state of science, if the notational system does not meet the requirements for possible inclusion of unlimited new concepts, such a system is not long last. It is thought that the span of life of any completely hierarchical classification is not more than 25 to 30 years.

When we consider that the Library of the Academy of Sciences of USSR is planning reclassification according to BBK for 15-20 years, the significance of this requirement of a notational system becomes evident.

The Notation in the Faceted Classification of Dr. Ranganathan

The notation of a faceted classification have certain advantages over other systems. But everything new that Ranganathan introduces is not contrasted with the already existing methods and principles of construction of classification but supplements and develops them. He has adopted the mixed notation for expanding the notational base; the 10 Arabic numerals, 26 capital letters of the Latin alphabet, 24 lower case letters, except i and o, punctuation marks and parentheses.

Such a notational base can be employed in many countries where the Latin alphabet is used. Certain drawbacks are the introduction of Greek letters for representing some main divisions which are introduced in some recent editions of Dr. Ranganathan's classification system [4, 5]. [This has now been abandoned]. This makes the system less acceptable. There are specific symbols for each stage of division The capital letters are meant for Main Classes and Chronological Division of the first stage, then the lower case letters for common subdivisions and for the first symbols of chronological divisions of second stage. Narrow special individual concepts in facets are represented by Arabic numerals in all divisions. When the facet formula is strictly observed (P, M, E, S, T), which in this system of classification expresses the structure, the class number brings out sequentially the content of any complex concept.

For example, let it be required to classify the concept "Foreign policy of Britain in Europe in the fifties". In the division V-History, V3 - England, 19-Policy; from the Chronological division we find N5 for the fifties. We get the ultimate class number as V3:19.5.N5 [According to the amendments of the reprinted 6th edn (1963), the correct number would be V3:195'N5]. Thus, each category is expressed with its own connecting symbol which regulates the order of arrangement of individual concepts in the class number and shows their synthetic relationships.

In this way each class number in the faceted classification is formed in strict conformity with its structure and this in effect satisfies the first requirement of a satisfactory notational system.

For the sake of simplicity of understanding and remembering symbols in the faceted classification system of Ranganathan, a system of uniformity in the representation of concepts is developed i.e. mnemonics is strictly maintained in the notational system:

(a) Uniformity is achieved by employing tables of common subject divisions such as general, geographical, chronological and language.

(b) For a single concept of a given class, the class number is given only once in one facet and afterwards it can be used in this class in any combination.

(c) These class numbers which are worked out in the preferred classes are used in all related classes also; for example: the schedules of chemistry is valid for chemical technology and selectively for mineralogy, mining etc. Thus Zirconium in all places of classification is represented by the number 144.

(d) When the facets of the main class do not fit in fully, they are used selectively to represent allied sciences or subjects.

Mnemonics in Ranganathan's system is achieved not only by the uniformity of symbols for related concepts but also by other means of analogy in relation to meaning expressed in the notation. For example according to the Principle of Increasing Quantity, differential equations in the division of Mathematics are specially divided in the following way:

Linear, Quadratic, Cubic, Quartic, etc.

In inorganic chemistry according to this very same principle, groups of elements receive class numbers in the increasing order of valency. In Ranganathan's classification system there exists a sequence in the notation according to the Principle of Later-in-Evolution. For example, in Biology the concepts have the following order: Embryo B; Child C; Adolescent D; and Old age E; etc. According to the Principle of "Bottom Upwards", the following sequence in the notation is achieved in Civil Engineering: Earth Work, Foundation, Floor, Support, Stair and Roof. Still many other examples of the principles of mnemonics of Ranganathan's notation system can be given. No concept is repeated at any place in Ranganathan's classification system. This permits to compress the entire universe of subjects, which is capable of reflecting very narrow concepts, and print it in only 100 pages. Such a compact table is very easy to work with and the class numbers remembered without difficulty. All these meet the second requirement of a satisfactory notational system.

The value of facet classification lies in the fact that it permits to classify very minute subjects. To achieve such a degree of minuteness, for example by UDC, a very lengthy class number will be required. Any specialist in classification knows well that if in the main sequence of traditional classification system, there is no place for a newly developed subject, the class number for it can be constructed by applying special subject divisions or by relating one concept to another. Such a class number will find a place within the general system without violating the general structure. Let us now suppose that a classification system is constructed out of the basic concepts, where each major division of classification consists of schedule of individual terms with corresponding class number for each term. The classifier in that case will not seek the entire subject in the schedules in order to classify a document, but will merely break the subject into basic concepts and select from the tables of isolates the corresponding class numbers and combine them in a strict order with the help of the symbols. This synthesised class number for the document freely fits into the general scheme.

Thus the very structure of the classification system enables a free inclusion of class numbers for a large number of newly developed subjects. In this respect faceted classification has a weak hierarchy. But in Ranganathan's classification system the schedule for individual terms are built within a logical sequence according to the decimal principle and here, as in any other traditional system, there can be difficulties with the appearance of new concepts. In order to avoid them, Ranganathan developed the principle of "Octave Device" [now called Sector Device] which is as follows:-

If it is necessary to accommodate in any one array ten divisions with nine digits (0 is not taken into account) only 8 (Octave) of them are taken in the following order. In the first such divisions: 1, 2, 3........ 8, 91, 92, 93........ 98, 991, 992, 993........ 998 etc., till infinity. In the second such divisions 11, 12, 13........ 18, 191, 192, 193........ 198 etc., till infinity. Each group of such 8 divisions is called an Octave. This principle of notation easily allows inclusion of an unlimited number of new concepts. Thus, Ranganathan further developed the generally accepted principle of decimal notation which enhances the vitality of the classification. FID accepted this principle for further improvement of UDC. There is yet another method of making a faceted classification more expansible and elastic. In this case the ending of a symbol should necessarily be added to the single division in the base and the system should not have hierarchical subordination within facets. In such cases the proportionality of the length of the new symbol is followed. This method is called the 'Group notation' by Ranganathan [6].

The principles underlying the notational system of facet classification make it more flexible than any other systems, and in this respect meet the third requirements of a satisfactory notational system.

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THE BIBLIOGRAPHICAL REFERENCE: A REVIEW OF ITS ROLE

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Citation counting and analysis has been the subject of a number of studies. These studies generally bring out the bibliographical, social and indexing functions of citations. The present paper summarises the studies and observations made so far and presents a bibliography of 51 papers on the subject.

Introduction

The bibliographical references, or citations, tnat are often gathered at the end of a scientific document or spread over in the text as footnotes, have a varied and distinct function in scientific communication. They contribute to scientific bricklaying, provide the necessary "currency" for recognition of a particular scientist among his peers as well as for establishing his property rights and priority claims with respect to the scientific contribution he makes, constitute an important source of information for the scientist, serve as a tool for some of the recent techniques of literature indexing and, above all, help to gauge the information gathering habits of scientists and indicate therefrom the literature that are indispensable to their work. This in turn, provide the librarians and documentalists with the basic data necessary for formulation of library aquisition programmes.

The subject has engaged the attention of several workers. An attempt is made here to summarize the observations made so far and also to bring out some of the studies undertaken with citations as the basis. It is apt to begin with the words of Kaplan, "The practice of citing other works is almost second nature to anyone writing a scholarly or a scientific paper" [1]. The more obvious functions of literature citation are (a) to give authority (and due credit) for facts quoted or statements made and confer intellectual and scientific respectability on the paper; (b) to direct the reader of the paper to other sources of information on the subject dealt with or the "prior art"; (c) to adequately describe in clear and concise terms the source or documents from which the statements or facts are quoted. But, a deeper inquiry would reveal that citations have a much wider contribution to science in its entirety.

Scientific Bricklaying

The phenomenon of cumulation of papers - the way in which each paper is built on a foundation of previous papers, then in turn is one of several points of departure for the next-- has been discussed by Price. In his brilliant exposition on the subject the writes, "The most obvious manifestation of this scholarly bricklaying is the citation of references. One cannot assume that all authors have been accurate, consistent, and conscientious in noting their sources. Some have done too little, others too much. But it is generally evident from a long run of any scientific periodical that around 1850 there appears the familiar modern pattern of explicit reference to previous work on which rests the distinct, well-knit addition that is the ideal burden of each paper. Before that time, though footnoting is as old as scholarship itself-- compare the very term scholia for the ancient footnote-- there is nothing like this attitude toward the accretion of learning" [2]

Another paper of Price displays how "the pattern of bibliographic references indicates the nature of the scientific research front". He tries to picture, in the context of that special relationship which is given by the citation of one paper by another in its footnotes or bibliography, the network of scientific papers which is obtained by linking each published paper to the other papers directly associated with it [3].

Citation Practice: A Social Device

The bibliographical citation, apart from inducing in science its cumulative nature, has been viewed as a distinct entity in the social system of science. Kaplan, in a critical study of the norms of citation behaviour writes "..... the citation practices of scientists today are in large part a social device for coping with problems of property rights and priority claims. Only incidentally do these citations serve as a careful and accurate reconstruction of scholarly precursors of one's own contribution" [5]. To a scientist, a recognition of his work by his own peers, that he has lived upto the exacting standards required of a scientist in terms of valuable contribution to science, is of paramount importance. Therefore, besides establishing their own interests with regard to bestowing their papers with intellectual and scientific respectability and establishing property rights and priority claims, there is also an important ethical consideration which is generally recognized among scientists. In reporting an investigation, the author is under an obligation to give credit to previous work which he has drawn upon and record his indebtedness to the work of others. This he does by means of the institutionally accepted mode of citation which, in turn, provides the necessary "currency" for professional recognition. Again, once a scientist's knowing peers judge his work worth the while he gains an access to invisible colleges. The citations thus serve also as an entrance fee for a new entrant to such colleges.

An unique feature of science is its openness. Kaplan recognises the openness of science and the role of citations in this regard when he notes "A contribution belongs to the whole community. ... The citation is probably among the more important institutional devices for coping with the maintenance of the imperative to communicate one's findings freely as a contribution to the common property of science ...." [5].

Tool for Literature Indexing

There is another field, that of literature indexing, where citations have cast an influence. The advent of the revolutionary techniques, such as, citation indexing and bibliographic coupling has, in fact, added a new dimension to the practice of citation. An enormous quantum of literature exist on citation indexing. In one of his paper [6] Garfield deals with this technique and makes a bibliographic recapitulation to emphasize, to the reader unfamiliar with citation indexes, both the advantages and the simplicity of citation indexing. Citation indexes could also be employed in sociological and historical research [7, 8]. This enhances the importance of citations. The papers of Kessler [9, 10] provide excellent studies on the potentiality of bibliographic coupling.

Source of Information

One of the generally accepted methods of scientific investigation is, indeed, to follow the scientific literature is the topic under investigation. Scientists use various sources--regular reading, recommendation of colleagues, references (or citations) in other publications, and the like-- in locating printed information. Of these, citations found in books and in periodical articles supply 5 to 15 percent of the references. The studies of Glass and Norwood [11], Hogg and Smith [12], Fishenden [13], and Scott [14] assessed the comparative importance of the above sources while Herner has made some general studies along this line [15]. An earlier study, that of Bernal, however, revealed that 37 percent of sources of references to the literature were references in articles [16]. The study of Urquhart showed that among the borrowers of the Science Museum Library, London, abstracts were main source of information for materials requested, followed closely by references in periodical articles [17]. Williams, observed that the patrons of the John Crerar Library relied to a great extent on footnotes in articles and other references-- footnotes to a greater extent than references in bibliographies following publications. The study did not cover current periodicals [18].

Citation Studies: Means to Gauge Information Needs of Scientists

Since references or citations constitute the mass of literature a scientist consults in the course of his investigation that ultimately culminates into a paper, the value of such citation in gauging the information needs of scientists has already been accepted. There have been several studies based on citations, chiefly reference counting, in order to produce lists of periodicals most frequently cited and thereby consulted; and to find out time-span or period of usefulness, language distribution and national origin of literature drawn upon by scientists. Such factors aid in the formulation of library acquisition programmes, planning of documentation and translation services and the like. An informative bibliography of earlier studies based on citations have been included in a paper of Tornudd [19]

The classic among such studies was that of Gross and Gross who confined themselves to reference counting in the Journal of the American Chemical Society for 1916-1925 with a view to determining the periodicals used most by chemists in 1926 [20]. This was followed by several studies limited to different scientific disciplines whose purpose was to determine, applying the same technique of citation counting, the periodicals most used in these disciplines. These include the studies of Allen [21] in mathematics, closely following the above study of Gross and Gross; Hooker [22] in physics; Barrett and Barrett [23] in chemistry; Baum [24] in meteorology; Gross and Woodford [25] in geology; Henkle [26] in biochemistry; Hackh [27], and Jenkins [28] in medicine; Coile [29], Dalziel [30], and McNeeley and Crosno [31] in electrical engineering; Croft [32] in agricultural chemistry; and of Smith [33] in chemical engineering. The study of Brown aimed at determining the relative importance of 838 serials to science as a whole and in different fields of science and presented lists of most frequently cited serials. The primary purpose of his study was "rather to attempt to ascertain what conclusions and inferences can be drawn from a study of such lists in various fields of science and what results can be obtained from such a study which will make the use of libraries by scientists more effective" [34].

There have also been studies, based on citations, that covered other areas. Broadus [35] aimed at finding forms, languages, and ages of publications used in psychology, and also from what other fields information and techniques were gathered. Fussler [36] confined himself to determining the research literature used in the United States in "pure" chemistry and physics. He studied four aspects (a) the importance of literature of various subject fields of chemistry and physics; (b) the temporal span, particularly the span between date of original publication and date at which it is used; (c) principal forms and national origin of literature used; and (d) the important serial titles for each field. He produced a study of changing values of certain periodicals published at different intervals by selecting volumes of chemical and physical journals published in different periods. Hintz [37] ascertained the extent of interchange of scientific information through the literature among botanists of the United States, Great Britain, France and Germany. Voigt [38] studied the interrelationship between scientists and research carried out in the applied fields of engineering and agriculture with particular emphasis to the analysis of subject fields in the pure sciences as they relate to the applied sciences. Burton and Kebler [39] considered the analogy between the "half-life" of radio-active substances and the rate of obsolescence of scientific literature. They compared the half-life of 9 subjects. Gomperts [40] studied the literature of vibrating plates and revealed that in more than 150 years the mean number of relevant citations per article per year has remained constant at 2.8, despite the fact the number of articles published since 1950 is three times the number of printed between 1787 and 1950. This leads to the general statement that for any given year, Ra = 2c, where R is the "citation factor" for that year and a is the total number of articles that have appeared up to and including that year. The constant c, probably varies with the subject. Çawkell [41] seeks to explain the reasons for the constant average number of references per article. Louttit undertook two studies-- one to determine whether psychologists draw on the world literature and cite foreign references proportional to the volume of foreign literature in the field [42] and the other to test the validity of the hypothesis of proportional citation of foreign references to the distribution of material by country and language [43]. Kofnovec [44] correlated a number of studies of the citation of literature references to obtain conclusions about the rate of obsolescence of chiefly periodical articles in science. A few studies have been reported in India. Gupta [45] studied the characteristics of documents cited by Indian physicists. He examined the citations in the Indian Journal of

Pure and Applied Physics, (5), 1967, in order to compile a list of the most cited periodical publications, and examine these publications from the view-point of country of origin, subject coverage, and age of the citations. The incidence of "self-citation" and "repeated citation" and reasons thereof were also examined. Karthikeyan and Guha [46] sought to measure the impact of the Referativnyi Zhurnal on the use of non-Russian literature by Soviet scientists from the citation analysis of articles in two Russian physics journals, viz. Dokladui Akademii Nauk, USSR (Physics and Mathematical Physics Sections only) and the Uspekhi Fizicheskikh Nauk, covering a period before the advent of the Referativnyi Zhurnal and another period when the abstracting service had established itself. Mitra [47] attempted to identify the characteristics of subject literatures used by Indian scientists. The citations appended to original articles published in 1966 in 26 core Indian periodicals were analysed in order to examine the relative importance of English-language, foreign-language and Indian (domestic) literature, and their usefulness according to period of publication, to scientists engaged in 14 subject fields. The incidence of self-citation was also studied.

The above review of studies based on citations would not be complete unless some of the criticisms on such techniques are noted. Literature records two important critics. Brodman [48] checked the basic assumptions of the reference counting method and correlated the relative value placed on specific journals by specialists with the value of these journals as measured through reference counting. The latter method appeared to be untrustworthy. Raising [49] discussed some of the early works including that of Gross and Gross. These were criticized as being based on basically unsound assumptions mainly in the subjective choice of sources, which ignores the fundamental statistical principle of the random sample.

Conclusion

The citation studies have no doubt certain limitations. Firstly, citations in journals and books need not cover the most useful material consulted. Secondly, such studies will be more meaningful if certain norms and ethics are followed in citation practices. There is little guarantee that all that have been cited have been actually consulted. After all, one is too familiar with the malpractices of window-dressing, padding or just sprinkling a few citations as an afterthought for merely enhancing the respectability of one's paper, or the devious attempt to avoid responsibility by leaning heavily on the work of others. Price [50] suggests that since now citations to previous work have become a valuable tool for literature indexing, referees and editors should summarily reject bibliographies that are either insufficient or padded. However, barring such isolated acts of dishonesty in scientific parlance, citations do play an important role in science in general and in scientific communication in particular. This could not be better reflected than in the words of Kaplan, "Whatever happens, it seems quite certain that we are less likely to look down upon the lowly footnote in the years ahead" [1].

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FROM WEINBERG TO SATCOM : THE PRESENT STATE OF INFORMATION SERVICES IN THE UNITED STATES

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Gives a descriptive account of the present United States information scene as seen through the Report of the Committee on Scientific and Technical Communication (SATCOM) of the National Academy of Sciences — National Academy of Engineering.

Within a span of six years (1963-69) two very important reports on scientific and technical communication with far reaching implications have been released from the United States dealing with the national problems of information handling and organisation. The first of these reports, the report[1] of the Weinberg Panel (1963) was the result of the US Government taking the initiative to focus attention on information services offered by the federal agencies to bring about a coordinated system. The second, the report[2] of the Committee on Scientific and Technical Communication (SATCOM, 1969) of the Academies of Sciences and Engineering, represents the effort of the scientific and technical community for coordinating the activities of both the federal and non-federal sectors and to establish a base for a national system of information services. The SATCOM contains fifty five recommendations relating to the needed policies and courses of action for creating a proper set-up for information handling and organisation, based on a three year intensive study of the existing status and future requirements of the scientific and engineering community with respect to the organisation, flow and transfer of scientific information. In order to appreciate and comprehend fully these recommendations, it may be necessary to have a peep into the recent past to get a proper perspective of the United States Information scene and the circumstances leading to the appointments of such high power committees.

A Historical Perspective

Although national concern for a rapid and efficient system of communication as a key factor to the progress of science and technology grew in the decades following the Second World War, a spurt to the national activities in scientific and technical information was given in 1957 alongwith the tremendous increase in scientific and technological research and development, when the Soviet Union launched its first satellite. Since then, information activities have been continually expanding. An idea of the expansion can be had from the expenditure on R & D and information in U.S.A. in 1967. The country spent $ 27 billion on R & D and $ 5 billion on information as against $ 20 million and 1.5 to 2% of this in 1965 respectively. But this expansion was not the result of a planned development. Growth was largely heterogenous depending on locally perceived needs and opportunities, though there was no evidence of critically inefficient operation or total failure at any point. The problems posed by expanding needs, however, made it imperative to take measures directed towards more effective coordination, planning and management.

Efforts of the Congress

Keen interest in the development of a satisfactory information system was shown by the two organs of the Congress and several study committees were appointed during the last two decades. Notable among the Senate Sub-Committees on information was the one headed by Senator Hubert H Humphrey. This Committee working through the years 1957 and 1960, produced the "most comprehensive body of data on scientific and technical information problems ever compiled by a committee of the Congress."[3]. Although this Committee could not accomplish much by way of legislative action, the studies resulted in the establishment of the Office of Science and Technology (OST). Almost during the same period, the House of Representatives also gave serious attention to the problems of information transfer. Among the several steps taken by the House Committees was the bill proposed by Representative Roman C Pucinski in 1969 for a National Science Research Data Processing and Information Retrieval system[4].

Executive Actions

While the Congress was actively considering the ways and means to develop a sound national system of information, the Executive was stimulating the development of a number of national plans for handling and organising scientific and technical information. The first of the planning effort was that of a panel under the President's Science Advisory Committee (PSAC) headed by W.O. Baker established in 1958 to assess the problems of scientific information exchange and the operation of the media and services handling such information. The National Defence Education Act passed in 1958 incorporating the recommendations of the Baker Panel provided for the creation of the Office of Science Information Service (OSIS) in the National Science Foundation. This new office of NSF set in motion a programme of giving active support to research and development in information.

Further studies for the planning and coordination were undertaken in 1962, when the President's Science Advisory Committee and the President's Science Advisor simultaneously appointed a panel chaired by Alvim M Weinberg and a small task group directed by J A Crawford respectively. The Crawford Task Group completing the work earlier, came out with the recommendation for the creation of separate units in the federal agencies to take care of information services. Such units were established in the federal agencies such as the Department of Defence (DOD), Atomic Energy Commission (AEC), National Aeronautics and Space Administration (NASA), etc.

Weinberg Report

The Weinberg Report issued in 1963 constitutes a significant landmark in the history of scientific and technical communication. This report highlighted the crucial importance of information as a basic requirement for R & D. Emphasising the point that the entire information process must be made an integral part of research and development, the report insisted that the various steps in the information transfer chain were also a part of the responsibilities of the organisations engaged in or cooperated with the creation of the information. The working scientists as well as other creators of information should, therefore, partake in the access services by providing keywords for articles or by preparing abstracts, etc. The reviewing function which needs recasting, critical analysis and synthesis of current findings, should be given more attention and that those who are engaged in the task must be rewarded adequately in terms of recognition and remuneration. The Committee felt that the technical information centres located in research settings and fulfilling the needs of specific areas of knowledge, should be given due recognition and support. The Federal Council for Science and Technology was the suggested mechanism for keeping the network of governmental systems under control and supervision. The Panel strongly asserted that non-governmental agencies offering efficient information services should be supported without being dominated. This report aroused wide interest not only in the United States but in other parts of the world. In fact information acquired a specific importance in the planning of science policies.

The Government responding to the recommendations of the Weinberg Panel, established the Committee on Scientific and Technical Information (COSATI) under the Federal Council for Science and Technology (FCST). The Committee on Scientific and Technical Information which has a outstanding record ever since its inception, operates through seven standing panels and a number of ad hoc task groups. To get an idea of the subjects tackled by COSATI, the seven standing panels are listed below:

1. Operational techniques and systems.
2. Information Sciences and Technology.
3. Education and Training.
4. International Information Activities.
5. Management of Information Activities
6. Information Analysis and Data Centres.
7. Legal aspects involved in National information systems.

The efforts of COSATI have gone far towards introducing standard procedures and greater co-ordination of effort among the information programmes of federal agencies.

Licklider Panel

Again in 1964, the Office of Science and Technology appointed a special panel headed by J C R Licklider to examine and assess the situation and trends in scientific and technical communication. The findings of this Committee revealed that government efforts in persuading the scientific community to cooperate and integrate the public and private services into a unified system had had very little success. The Committee stressed the need for centralising certain functions such as over-all planning, monitoring compatibility, and developing standards, and decentralising others such as abstracting, indexing, reviewing, etc. The Committee emphasised wider and more systematic use of assessments of user needs to develop need-based services.

Committee on Scientific and Technical Communication (SATCOM)

While the various panels had made recommendations for certain broad policies, specific implementation was left to the uncordinated judgement of many diverse individuals and organisations. There was nothing analogous to COSATI to coordinate the diverse activities of the private sector, no federal agency having been able to accomplish this task with any degree of success. There was, therefore, an urgent need for a non-federal body to facilitate coordinated planning.

It was at this juncture in 1966, that the National Science Foundation, with the concurrence of the Office of Science and Technology and COSATI requested the Academy of Sciences and the Academy of Engineering to survey information activities in the country in greater detail than ever before and make pointed recommendations for implementation. The Academies with their established prestige, non-governmental status, and close working with scientists, private organisations and federal agencies, were considered to be the most appropriate bodies to undertake such a task. The Academies responded and the Committee on Scientific and Technical Communication came into being in February 1966.

The Committee was composed of representatives from various segments of non-federal community such as major scientific and technical disciplines, libraries, commercial publishers, industry and universities. "The membership included a wide range of interests and types of expertise on scientific and technical information activities to assure insight, awareness of the implications of new technologies and sensibility to the information problems and needs of the everyday working scientists, engineer and practioner."[5]. The Committee consisted of twenty five members headed by Dr. Robert W Cairns, Four ad hoc task groups were appointed by the Committee to develop perspective on possible coordination procedures in certain specific fields. In addition, Satcom maintained contact with two hundred key individuals from various institutions and disciplines as consulting correspondents.

The terms of reference to the Committee were as follows: "The Committee will give special attention to (1) Information activities, policies, and relationships, interrelating the groups and organisations of the private sector and (2) Interaction and interrelationship between the federal government and the private sector in connection with scientific and technical information, especially federal executive or legislative actions or operations that affect subtantial portion of the private sector, with a view to making recommendations to the organisations and individuals of the private sector, as well as to the federal government. The Committee will also consider, particularly (but not exclusively) in the light of the overall problem:

1 Methods for promoting more effective relationships between information systems and scientists and engineers, the principal producers and users of scientific and technical information;

2. Techniques and systems for facilitating the effectiveness of information transfer; and

3. Needs for new means of providing greater selectivity and consolidation in information transfer. [6].

The SATCOM was in existence for three years. The final report was presented in June 1969.

Objectives and Principles

The chief objective of SATCOM was to build upon and strengthen the existing pluralistic and decentralised complex of information services by fostering greater cooperation and coordination among its diverse components. To achieve this objective, a few broad guiding principles were developed. These were (1) Information services should be responsive to user needs and must have the flexibility to adapt rapidly to changes; (2) Authority for organisation must be distributed, as opposed to the creation of a monolithic centralised one; and (3) Planning of information activities must involve constant attention to simplication and consolidation of existing knowledge and must be reprocessed to fit the exact user needs.

The report also identified certain problem areas around which discussions have been centred. They were (1) The relative role of the federal government and private organisations vis-a-vis information transfer process; (2) Economics of information services; and (3) Impact of new techniques on scientific and technical communication programmes and practices. With these as the basic approach, the report made a thorough study of the information services and offered recommendations, fifty five in number, pertaining to the following areas:

1. Planning, coordination and leadership at the national level (11).
2. Consolidation and reprocessing, services for the user (12).
3. The Classical services (16).
4. Personal information (2).
5. Studies, research and experiments (10.

Creation of a permanent SATCOM

Concentrating its attention first on the central issue of creating a suitable mechanism for coordinated planning, SATCOM recommends the establishment of a permanent commission on scientific and technical communication for stimulating greater coordination among private groups and bringing them into close touch with government agencies. The permanent SATCOM would be responsible to the National Academies of Sciences and Engineering. After weighing the effectiveness of the possible alternatives, the Committee concludes to locate the proposed body within the structure of an existing organisation which fulfills the required conditions. The four major reasons stated are : "(1) They would afford ready access to maximum knowledge and expertise in science and technology; (2) they would ensure broad representation of the organisations, groups, and individuals whose efforts depend upon and influence scientific and technical communication; (3) they would facilitate the desired type of interaction with the federal government; and (4) they represent a longstanding tradition of diversified and intensive involvement in scientific and technical communication activities. "[7].

While there is no difference of opinion for the need for a permanent coordinating body, there has not been complete aggrement for the creation of a permanent SATCOM to undertake this responsibility. For instance, Representative Pucinski's Bill to the Congress, for the creation of an independent organisation at the governmental level, is an alternative. This Bill seeks an amendment of the National Defence Education Act of 1958 to provide for the establishment of a National Science Research Data Processing and Information Retrieval System. Commenting on the SATCOM report, Pucinski observes, "unfortunately the report fails to recognise the core of the solution to the problem; the need for one authority, one responsible agent, or any other term which describes the source which will be responsible and have the complete authority and all needed resources to implement a National Information System as proposed in my bill H. R. 8809. " [8].

The subject of the second recommendation in Group 1 advocates the concept of shared responsibility between the federal and non-federal agencies to introduce effectiveness and economy in the management of scientific and technical information. This policy would direct government sponsored but discipline oriented programmes to be managed by appropriate scientific and technical societies, by federations of such societies or in special cases by commercial organisations. The creation of SATCOM would ensure the mechanisms necessary to guide the evolution of scientific and technical communication programmes in balanced and flexible responsiveness to the requirements of both governmental and private institutions.

Page Charges

Elaborating on the Wienberg Panel's thesis that information services are an integral part of research and development, SATCOM urges that federal research grants should include "page charges"* which would meet the cost of information dissemination as a whole. This means that the "page charges" should include the cost of announcement, awareness, access appraisal and review services. Hence the Committee recommends increasing the scope of the 1961 Federal Council of Science and Technology page charge policy statement to include the processing of information for access, consolidation and repackaging. The American Institute of Physics, as an experiment, extended the page charge policy to include abstracting and indexing by levying ten dollars per article.

International Cooperation

Although SATCOM addresses itself only to the governmental and private organisations of the United States, it has not lost sight of the fact that scientific and technical communication is a world activity. The rest of the recommendations in Group 1, except the last two, pertain to international cooperation in information exchange programmes. Such international communication activities may take the form of (1) direct arrangements between societies or government agency programmes for sharing the work and products of information services; (2) cooperative international research projects, such as the International Geophysical Year and the International Biological Programme and (3) efforts of international organisations to stimulate or develop cooperative arrangements among nation that will facilitate the flow of scientific and technical information.

Copyright and Standardisation

Two final recommendations on national planning refer to the special problems of widespread interest and concern viz. Copyright and Standardisation. These are complex issues and are related to problems other than scientific and technical communication. New techniques in photoduplication of documents have raised new complications and hence will have to be tackled by suitable legislative action. With regard to the problems of standardisation introduced by the use of computers, the Committee suggests the appointment of a task group to study this problem for developing acceptable standards.

Consolidation and Reprocessing

The second group of sixteen recommendations relating to consolidation and reprocessing of information reiterate the views expressed in the Weinberg Report. The annual reviews, the Advances and Progress series, the State-of-art compilations, etc. represent this type of activity. But the preparation and use of such material, the Committee feels, has not kept pace with the flood of useful new information in the scientific and technical literature. SATCOM fixes the responsibility on the scientific and technical societies for identifying the needs for critical reviews and data compilations, furthering their preparation, fostering awareness of their existence and stimulating education in their use.

Need Group Services

Related to the problems of increased activity in the preparation and publication of critical reviews, are those of reprocessing and repackaging of information to meet the exact needs of special groups of practioners in industry, engineering, medicine, agriculture and mission oriented projects, facilitating practical application of information. The Committee feels that this type of 'hand-tailored third level services' for groups of at least a thousand who share common information could be met and must be provided. Here again the scientific and technical societies should show initiative and enterprise to identify such groups and stimulate efforts to fulfil the needs for state-of-the-art surveys, reviews, and data banks and also provide for the practioner's need for continuing education. The traditional indexing, abstracting, bibliographical, review services can supply the necessary data for such specialised and repackaged files. In this context, reference is made to the for-profit organisations which have been successfully operating such need group services and the scientific and technical societies should encourage such organisations to undertake more of the services. The Information Analysis Centers which have a great potential for need group services, should be encouraged and aided.

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*Page Charges: The page charge concept was pioneered by the American Institute of Physics almost forty years ago. The implication was that funds alloted for research must include the cost of publication of the results also. The page charge was set at an amount approximately equal to the cost of getting an article ready for printing, which would include editing, preparation of manuscript for the printer, typesetting and proof-reading. In 1961 the FCST recognising the validity of the page charges issued a policy statement to include page charges in federal research grants.

The Classical Services

The Report includes basic abstracting and indexing services, library functions, formal and semi-formal publications and meetings under the heading 'Classical Services. In accordance with its philosophy of shared responsibility, SATCOM explicity advocates management of discipline-wide basic indexing and abstracting services by the appropriate scientific and technical societies and the management of other broad bibliographies such as title listings by commercial organisations, national libraries or societies or government agencies when necessary. Adequate financial assistance must be provided for literature-access services by the departments and agencies of the federal governments. Two recommendations are on steps that scientific and technical societies, aided by the National Federation of Science Abstracting and Indexing Services, can take to improve the quality, timeliness, and efficiency of preparation of the necessary abstracts and indexes.

While recognising the role of libraries in the dissemination of information and in evolving national information systems, the Committee does not believe in merely financing libraries without any relation to the cost of library services. Therefore a funding policy is recommended, aimed at introducing (1) a more realistic reflection of library costs in the conduct of scientific and technological work; (2) a closer relationship between costs and services; and (3) more options of extra cost. At this point, reference is made to the survey of the National Advisory Commission on Libraries. SATCOM's recommendations relating to libraries are in harmony with the recommendations of Library Commission.

Another recommendation on libraries focuses on professional education and the training required for users of library services. With regard to the former, the Committee advocates training programmes that place greater emphasis on system analysis, system planning and operational analysis of libraries and library services. Training in the use of libraries must be made an integral part of the education process.

Formal Publications

The increasing volume and diversity of primary scientific and technical periodicals have raised special and serious problems in the production and management of periodical publications. One relates to the production costs which have been steadily rising which in turn have posed unending problems to libraries. A systematic study and analysis of the economics of these publication is a pressing need in order to determine the volume and method of support that federal government could give. Until such data have been assembled and possible alternative funding arrangements have been tested, the Committee urges that sponsors of research and development should continue to provide support through page charges.

Another problem that confronts periodical publications is the relentless expansion in the amount of new material to be published. On account of the extraordinary delay in getting a paper published in a periodical, authors have resorted to other means of publication, for instance publishing preprints. The volume of preprint publication, which lack quality control, have risen to such proportions that it has been threatening to undercut the age long journal system. SATCOM's recommendations regarding this problem offer suggestions for reducing delays in publication, using new advances in the technique of production, selective distribution service, publication of 'Letter journals' and 'Super journals'. Letter journal would carry promtly brief, referred papers with issue period and publication lag not exceeding one month. Super journals are for organised reprinting from a group of journals covering either a narrow area or a group of cognate fields, of selected papers recognised as most outstanding. SATCOM also holds the view that the preprint system could coexist with the journal system provided there is adequate bibliographical control, of preprints, accessibility through storage in depositories and control of distribution necessary to protect formal publications. With regard to the meetings, conferences, seminars and the like, which are effective forums for informal communication, SATCOM urges the sponsors of such gatherings to explore means of enhancing the effectiveness of such meetings.

Personal Information Communication

Personal informal exchanges play a major role in the transfer of scientific and technical information among scientists, engineers and practioners. But accurate and quantitative measurement of the effectiveness of the informal interpersonal communication as against the other methods and media, has been found to be difficult to get, although such studies are being undertaken. However SATCOM offers two recommendations on this. One stresses the importance of providing ample opportunities and facilities for informal communication at meetings and the like, and the other encouraging leave facilities for the exchange of interinstitutional visits and personnel.

Studies, Research, Experiments

The final group of ten recommendations deal with research studies needed to exploit fully the new technologies available for developing efficient information systems. The advent of the electronic computer, affording opportunities for innovations has commenced a new chapter in scientific and technical communication. Combined with this, the development of techniques for rapid and inexpensive means of reproduction of documents has opened up new possibilities for greatly improved information services. In the context of this situation, SATCOM observes "the systematic use of new techniques in document production and distribution as well as support of basic abstracting, indexing and bibliographic services makes it possible to handle the escalating requirements of volume and diversity of operation without a corresponding escalation in cost."[9].

A number of experiments in the different areas of scientific and technical communication have been undertaken in the past decade both by government agencies and private organisations. A growing number of both for-profit and no-for-profit organisations are introducing computerised photocomposition into the production of scientific publications, particularly for the publication of periodicals. Good programmes for proof-reading and editing are also being developed for cutting publication time. Improved methods of distribution are also being tried using the computer to obtain for the customer, on subscription, full texts of articles, roughly based on customer interest profiles. The American Mathematical Society's programme of a Mathematical Offprint Service (MOS), which offers to a subscriber on a continuing basis reprints and/or title listings of articles, satisfying the interest specified in his interest profile, is an example of this kind of Selective Distribution Service. In 1968, the System had about 1200 subscribers, and the Service was available at the rate $ 30 for 100 reprints.

There are also a number of full fledged Selective Dissemination of Information Systems (SDI), representing various levels of sophistication operated in government agencies and industrial Corporations.

The increasing availability of machine readable records of full texts of documents, bibliographies and data, is making new services available to users and enhance the potential for developing cooperative efforts in various information programmes. The well known example of MEDLARS enable the National Library of Medicine Regional Centres to develop special services for users in their respective geographical areas. The distribution of MARC tapes by the Library of Congress permits libraries in many of the country to use them for local cataloguing purposes. Table 1 gives an idea of the various machine readable records put by the different organisations. Besides these, a number of information systems have been developed using the on-line computers for access and search in large bibliographic files from remote controls. These systems provide rapid response to reference queries, providing dialogue assistance to help in the formation of search questions. Some of the examples are the Technical Information Project (TIP), a part of the Multi-Access Computer (MAC) Project of the Massachusetts Institute of Technology, and several systems developed by the Systems Development Corporation. A list of such Systems developed by various organisations is given in Table 3.

The application of advanced technology to the development of new techniques in information services, presents a great many challenging problems. The recommendations of SATCOM suggest significant and much needed types of experiments involving (1) machine-aided indexing, (2) evolutionary indexing of small, widely used, single-interest-area files, (3) development of standard structures for each widely used bibliographic documentary information element. Special emphasis is placed to the participation of competent scientists, engineers and practioners in such experiments. The government should support large scale experiments involving large population and the use of advanced technologies.

A General Appraisal

Although there is nothing radically new in the contents of the recommendations of SATCOM, being mostly reiterations of similar earlier reports, the detailed and authoritative survey, assembling a great mass of information and date, makes this report an invaluable source document on the growth and development of information services in the United States. The extensive bibliography consisting of 172 entries adds considerably to this source value.

The Report has received general approbation from all sections of the scientific and technical community, including library and information specialists. There appears to be, however, some disagreement on the recommendation relating to the creation of a permanent SATCOM, to which reference has already been made in this paper. Some of the other criticisms on the report are relating to attention given to (1) behavioural sciences; (2) education and training for future librarians, information scientists and administrators of information systems; (3) information on research in progress.

Burchill feels that the report is parochial in the sense that except for physical sciences and bio-medical sciences to a lesser extent, "little attention is given to problems impeding effective communication in behavioural sciences, including education, housing and urban development."[10]. The experiences of the Educational Resources Information Centre (ERIC) is barely reflected in the report. The roles of universities in strengthening communication programmes has been virtually ignored.

Fry observes that the Report has largely neglected consideration of the education and training of future librarians, information scientists and administrators of information systems, which is considered essential to fundamental improvement in scientific and technical communication. He says that "Programs in information science and technology are frequently a patchwork of separate courses which may or may not relate to real life situation and to the needs of the scientific and technical community. The theoretical underspinning which the field desparately needs has not yet emerged."[11]. The detailed treatment given to many of the facets of information services, has not been given to the present state and future needs of personnel for operating information services.

Speaking on the importance of information on research in progress, Ben-Ami Lipetz suggests that "this aspect deserves development and encouragement along with, if not ahead of, the other approaches considered by SATCOM. [12].

Follow up Action

It appears that COSATI had sponsored a Seminar on the SATCOM report to obtain a better understanding of SATCOM recommendations and to encourage broad dissemination of the report in government circles. An ad hoc study group of the Office of Science and Technology was also formed to make recommendations, based on SATCOM findings, for any government action. But nothing is known as yet on the outcome of the report.

Conclusion

Much of the material dealt with in the SATCOM report naturally relates to the information systems developing in the United States and may not have any great relevance to situations obtaining in developing countries. But the point that SATCOM brings out convincingly that information is not only the product of research but also the raw material for further investment on Research and Development, and any support given to information activities is only strengthening the foundations of research, is noteworthy. In fact, SATCOM observes, "Information costs are usually no more than a few per cent, at most, of the cost of doing scientific and technical work. The improvement in the efficiency of such work that would result from increasing the effectiveness of information handling procedures would offset--easily and several fold-- information costs substantially greater than the present level of expenditures for this purpose."[13].

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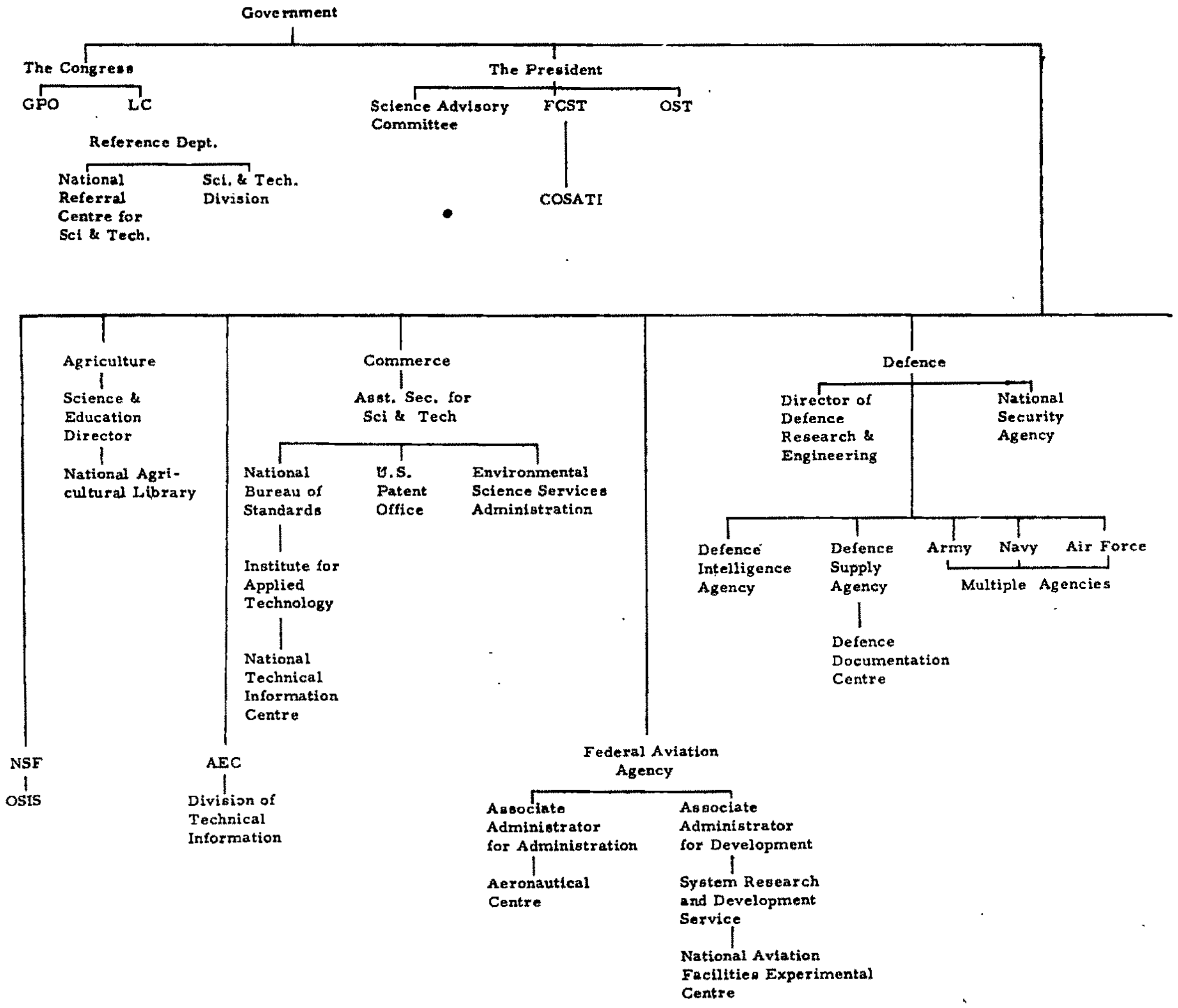
TABLE 1 Examples of Bibliographic Records in Machine-Readable Form Offered by Private Organizations

Organization	Distributed Records
American Institute of Aeronautics and Astronautics	International Aerospace Abstracts
American Petroleum Institute	Abstracts of Refining Literature Abstracts of Refining Patents
American Society for Metals	Review of Metal Literature[a]
American Geological Institute/ Geological Society of America	Bibliography and Index of Geology Exclusive of North America[b]
American Psychological Association	Psychological Abstracts
American Society of Mechanical Engineers	Applied Mechanics Reviews
BioSciences Information Service	Biological Abstracts
Chemical Abstracts Service	Chemical Abstracts Condensates Basic Journal Abstracts Chemical-Biological Activities Chemical Titles Polymer Science and Technology–P(atents) or J(ournals)
Derwent Publications, Ltd.	Farmdoc, Plasdoc, Ringdoc
Engineering Index, Inc.	Electrical/Electronics and Plastics sections of Engineering Index
IFI/Plenum Data Corporation	Uniterm Index to U. S. Chemical Patents
Institute for Scientific Information	ISI Source Data Tapes ISI Citation Tapes Index Chemicus Registry System
CCM Information Sciences, Inc.	Pandex Airmail Weekly Tape Service
Project URBANDOC, Library, City University of New York	Bibliographic records related to urban planning and renewal
R.R. Bowker Company	Publisher's Weekly, Forthcoming Books Paperbound Books in Print Subject Guide to Books in Print Children's Books for Schools and Libraries

a Now Metals Abstracts. b Now Bibliography and Index of Geology

ORGANISATION OF SCIENTIFIC AND


Government
The Congress
GPO
LC
Reference Dept.
National Referral Centre for Sci & Tech.
Sci. & Tech. Division
The President
Science Advisory Committee
FCST
OST
COSATI
NSF
OSIS
Agriculture
Science & Education Director
National Agricultural Library
AEC
Division of Technical Information
Commerce
Asst. Sec. for Sci & Tech
National Bureau of Standards
Institute for Applied Technology
National Technical Information Centre
U.S. Patent Office
Environmental Science Services Administration
Federal Aviation Agency
Associate Administrator for Administration
Aeronautical Centre
Associate Administrator for Development
System Research and Development Service
National Aviation Facilities Experimental Centre
Defence
Director of Defence Research & Engineering
National Security Agency
Defence Intelligence Agency
Defence Supply Agency
Defence Documentation Centre
Army
Navy
Air Force
Multiple Agencies

TECHNICAL INFORMATION SERVICES IN USA

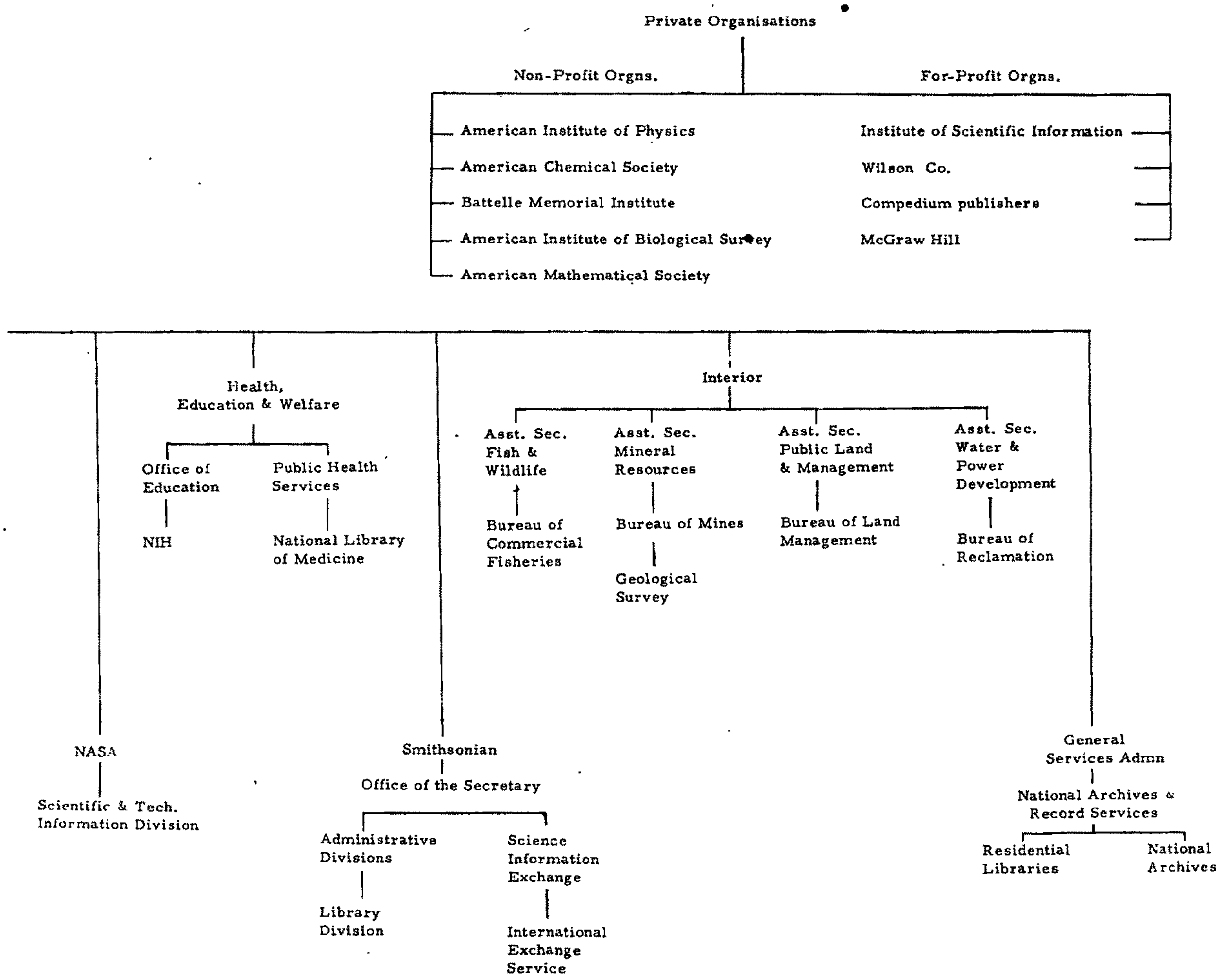

Private Organisations
Non-Profit Orgns.
For-Profit Orgns.
American Institute of Physics
American Chemical Society
Battelle Memorial Institute
American Institute of Biological Survey
American Mathematical Society
Institute of Scientific Information
Wilson Co.
Compedium publishers
McGraw Hill
Health, Education & Welfare
Office of Education
Public Health Services
NIH
National Library of Medicine
Interior
Asst. Sec. Fish & Wildlife
Bureau of Commercial Fisheries
Asst. Sec. Mineral Resources
Bureau of Mines
Geological Survey
Asst. Sec. Public Land & Management
Bureau of Land Management
Asst. Sec. Water & Power Development
Bureau of Reclamation
NASA
Scientific & Tech. Information Division
Smithsonian
Office of the Secretary
Administrative Divisions
Library Division
Science Information Exchange
International Exchange Service
General Services Admn
National Archives & Record Services
Residential Libraries
National Archives

TABLE 3 Representative on-Line Reference-Query Systems

Organization	System Name	Computer Facility	Status
System Development Corp.	MICRO CONVERSE LUCID BOLD CIRC/COLEX ORBIT TDMS	IBM AN/FSQ-32 time-sharing system	Operational at various times
Lockheed	DIALOG	IBM 360/30	Implemented with a storage of over 300,000 document citations from NASA STIF. A continuing service for NASA Headquarters
	CONVERSE		8,000 documents
Bunker-Ramo	NASA-Recon	UNIVAC 1050	2-month operational test at 6 NASA facilities. 6,000 searches made by scientists, engineers, and librarians
Massachusetts Institute of Technology	TIP	IBM 7094	April 1962-present. A continuing service being run as part of Project MAC, using a central computer with 100 remote consoles. Approximately 400 users are serve
Stanford University	SPIRES	IBM 360/75	First demonstration in 1968. Planned user population of about 100 high-energy physicists
Data Corp.	Data Central	IBM 360/40	1967-present. A continuing service based on Recon Central of Reconnaissance Div., AF Avionics Lab
Xerox	Datrix		Pilot demonstration with material from Dissertation Abstracts
Bolt Beranek and Newman	RIS	DEC PDP-1-D	1966-present. Various document and data files on a user-formated file structure

current documentation literature

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LIST OF PERIODICALS COVERED IN THIS ISSUE

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Journal of Chemical Documentation [J Chem Doc]	10(1)
Journal of Documentation [J Doc]	26(1-3)
Library Association Record [Libr Assoc Rec]	72(1-8)
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Library Journal [Libr J]	95(1-14, 16-17)
Library Quarterly [Libr Quart]	40(2)
Library Review [Libr Rev]	22(5, 6)
Scientific Information Notes [Sci Inform Notes]	1(4, 5), 2(1-4)
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